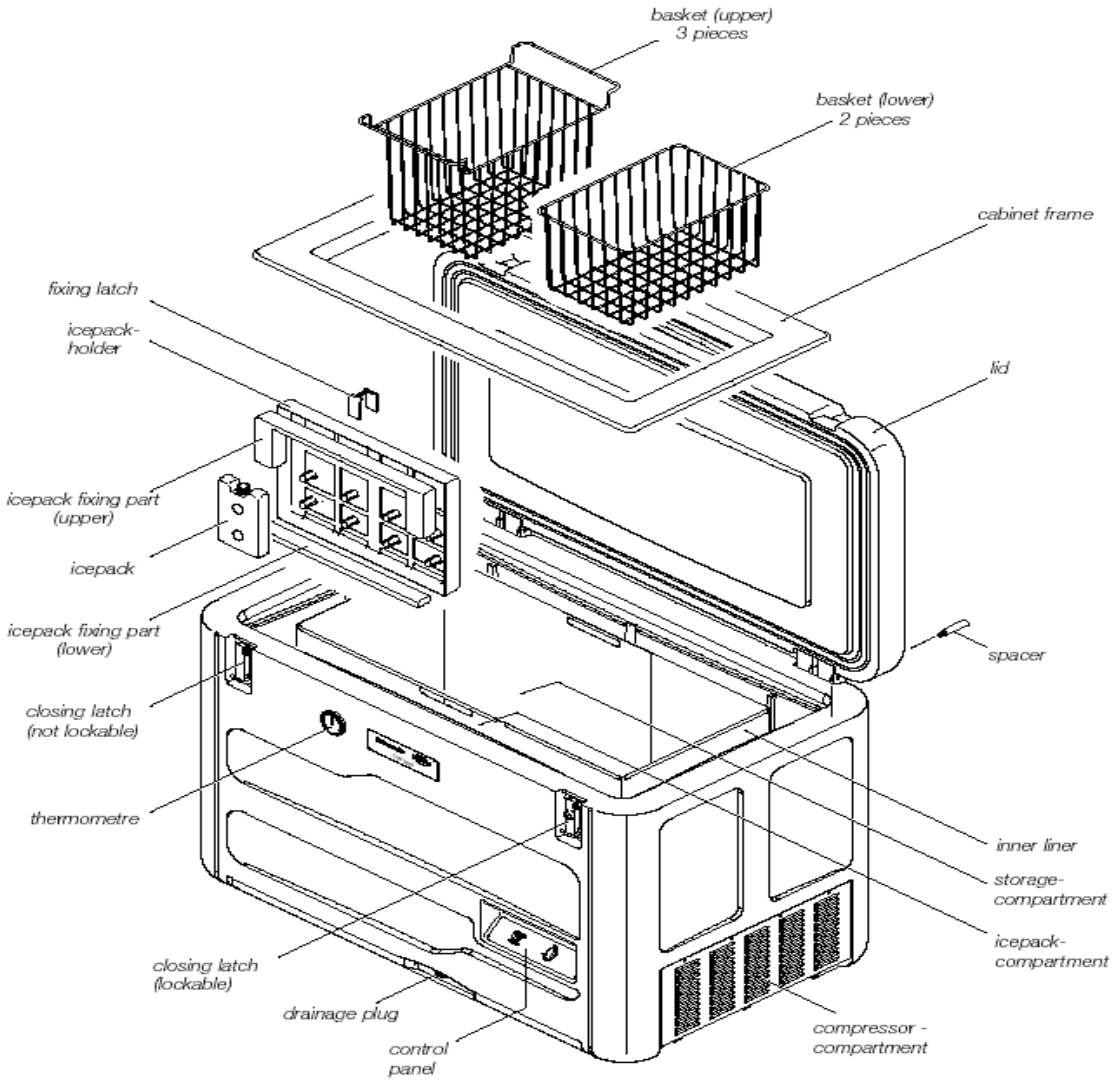
MEDICAL SYSTEMS

TCW 3000 Ice liner refrigerator or freezer

Every chain is only as strong as its weakest link !

MEDICAL SYSTEMS

OVER VIEW



MEDICAL SYSTEMS

INSTALLATION

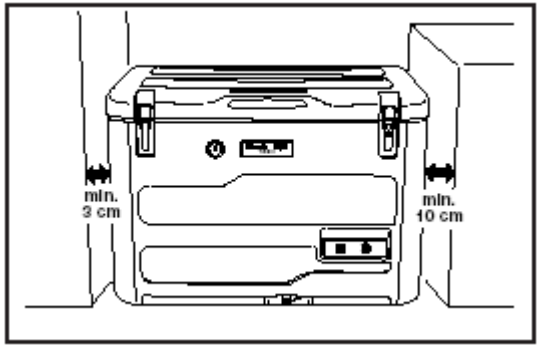
•The unit must be set up in a **dry well-ventilated** place. Avoid direct sunlight or locating it close to a heat source.

•The place must be protected against **bearing rain and dust**.

•Ensure that the unit is steady and **perfectly levelled** and does not touch any of the units next to it.

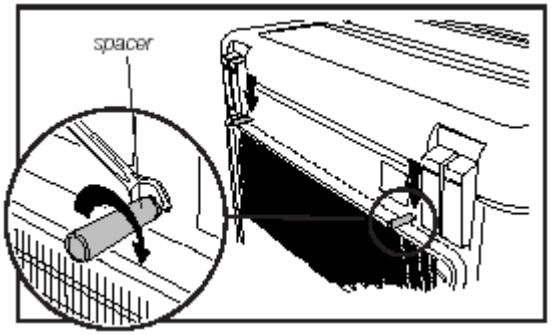
•A **good air circulation** especially around the compressor is essential for trouble-free operation. Keep the ventilation openings of the compressor cover always **free from any obstructions**.

•Make sure that a **minimum distance** is provided between the TCW3000 and any wall or other device located next to it.



MEDICAL SYSTEMS

INSTALLATION

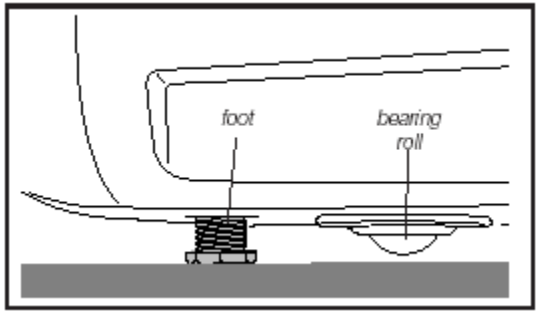


•Two **spacers are included** with the TCW3000. These must be attached to the rear of the unit, as shown in the figure, before positioning the unit against the wall.

•Do not locate the unit below a **ceiling fan** or right next to air-conditioning equipment.

•To ensure proper function, the device must be standing **horizontally**. Use a water level to check and correct if necessary.

•The ILR is equipped with 4 bearing rolls. Once the unit is in its final position, the 2 **feet** next to the front rolls must be unscrewed to **immobilise** it and stop it rolling away. Screw the feet with the provided key until the rolls do not touch the floor anymore.



INSTALLATION

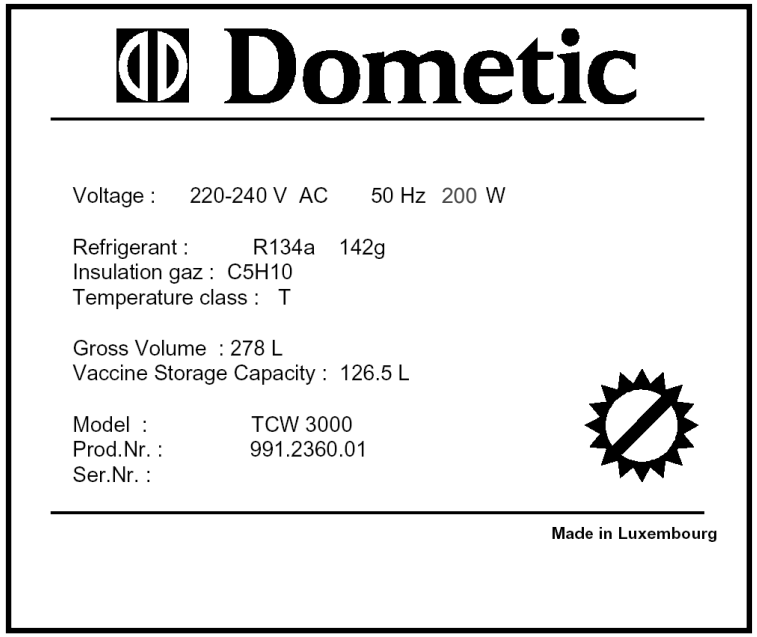
Distance holder

Integrated special plastic bearing rolls

4 adjustable stoppers

POWER SUPPLY / ELECTRICAL CONNECTION

•Before connecting the unit, **check** whether the details on the **data plate** on the back of the unit correspond to local values.


Dometic
Voltage : 220-240 V AC 50 Hz 200 W
Refrigerant : R134a 142g
Insulation gaz : C5H10
Temperature class : T
Gross Volume : 278 L
Vaccine Storage Capacity : 126.5 L
Model : TCW 3000
Prod.Nr. : 991.2360.01
Ser.Nr. :
Made in Luxembourg

•A suitable **3-pin plug** must be attached to the connection cable. The leads of the cable are marked as follows:

Green / yellow	=	Earth
Blue	=	Neutral
Brown	=	Phase

•Before connecting the unit and switching on for the first time, allow it to **stand still for 30 minutes**.

POWER SUPPLY / ELECTRICAL CONNECTION

•To prevent problems with other electrical equipment causing this unit to malfunction, it should be connected to a **separate circuit**. Avoid multiple-socket.

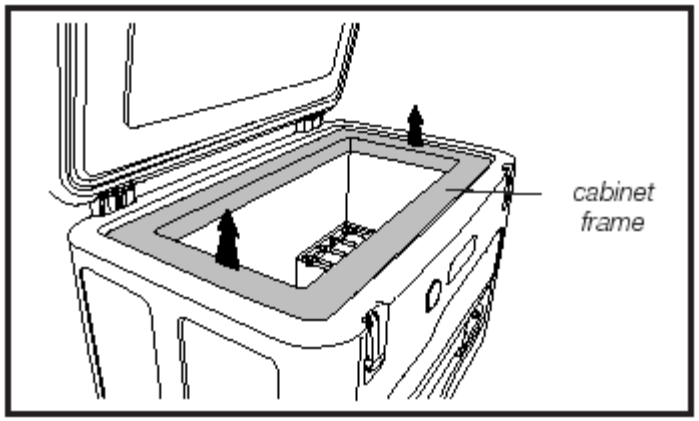
•Make sure that the plug is **easy accessible** so that if needed, it can be easy disconnected without having to move other equipment or furniture.

•The TCW3000 is equipped with a **compressor** which requires **low starting current** and can also operate within a range of voltage variations. E.g. If the normal operating voltage is 230 volts. 50 Hz. AC. It can start even when the supply voltage occasionally go as low as 150 volts or as high as 280 volts.

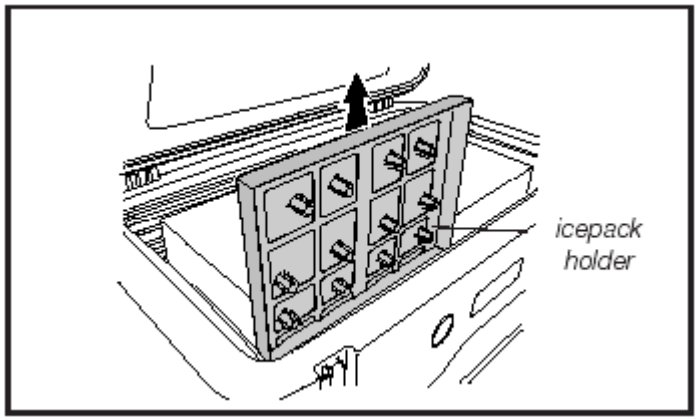
•Although the ILR is capable of operating within a wide range of voltage variations, for extra safety one separate Automatic Voltage Stabilizer should be used with it.

MEDICAL SYSTEMS

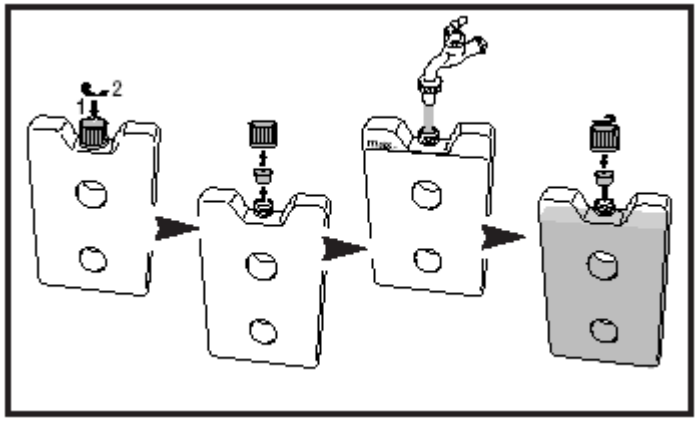
PREPARATION



Open the lid and remove the cabinet frame.

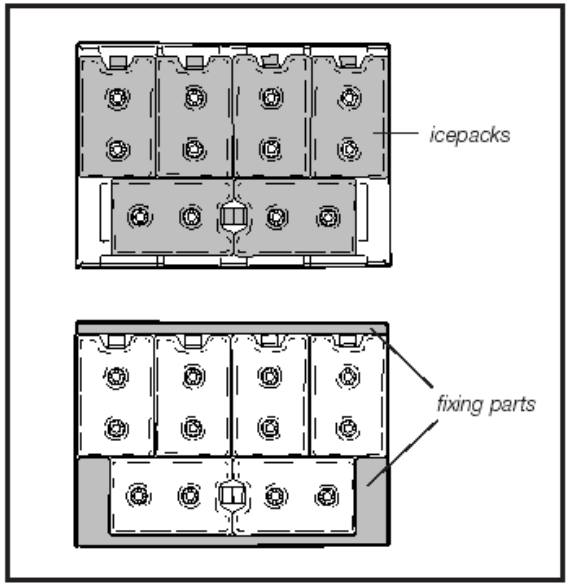


Remove the icepack holder from the icepack compartment.

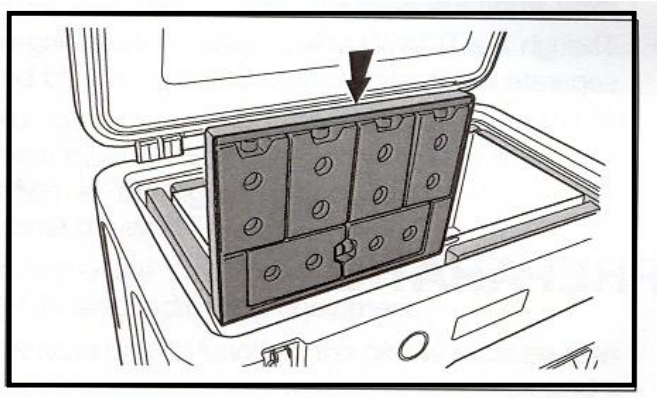


Fill the provided 36 icepacks with <u>cold and clean water</u>.

PREPARATION



Insert the icepacks into the icepack holder (6 icepacks per holder) and fix them with the 2 fixing parts (foam).



Carefully introduce the filled icepack holder – the ice pack turned to the outside of the cabinet – into the lining compartment between the inner and outer cabinet. Watch out to introduce the holders in the correct way and not to **damage the evaporator tubes**!

PREPARATION

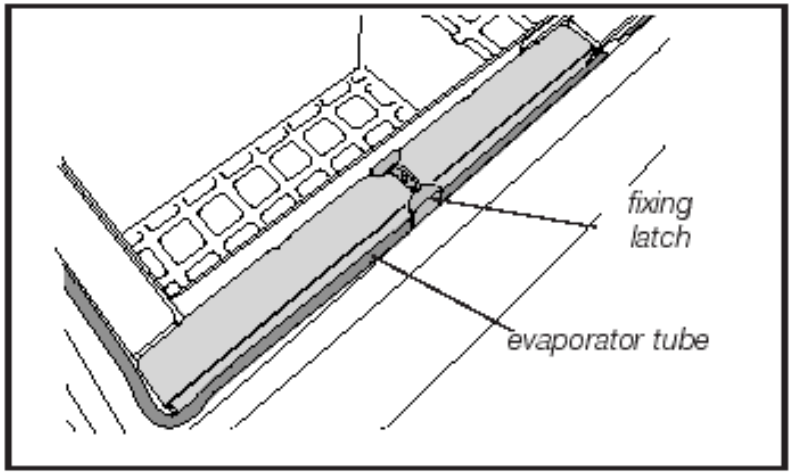
Ice lining with Ice packs of 0.6 l: 36 pieces

MEDICAL SYSTEMS

PREPARATION

Ice lining with Ice packs of 0.6 l: 36 pieces

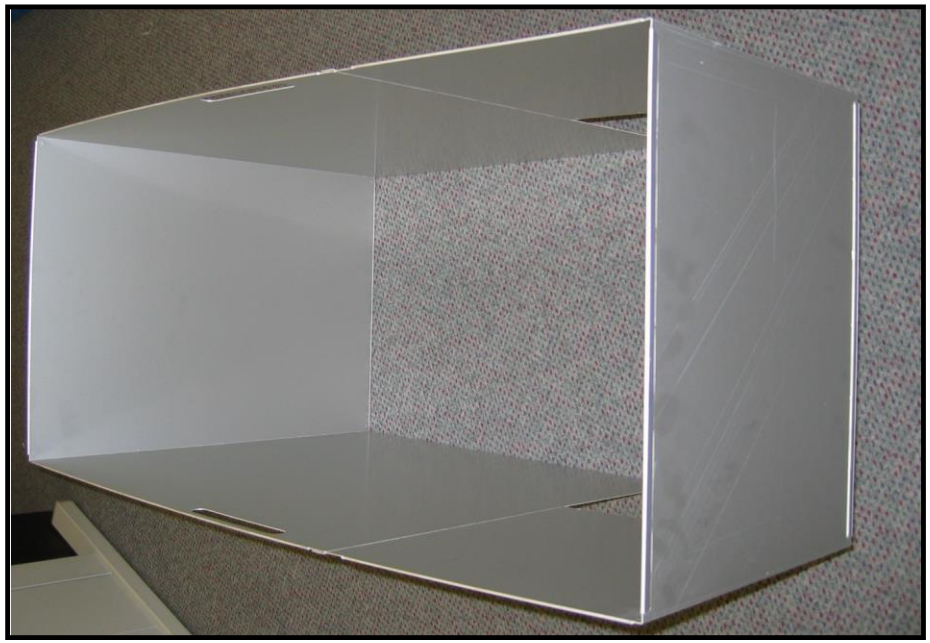
PREPARATION

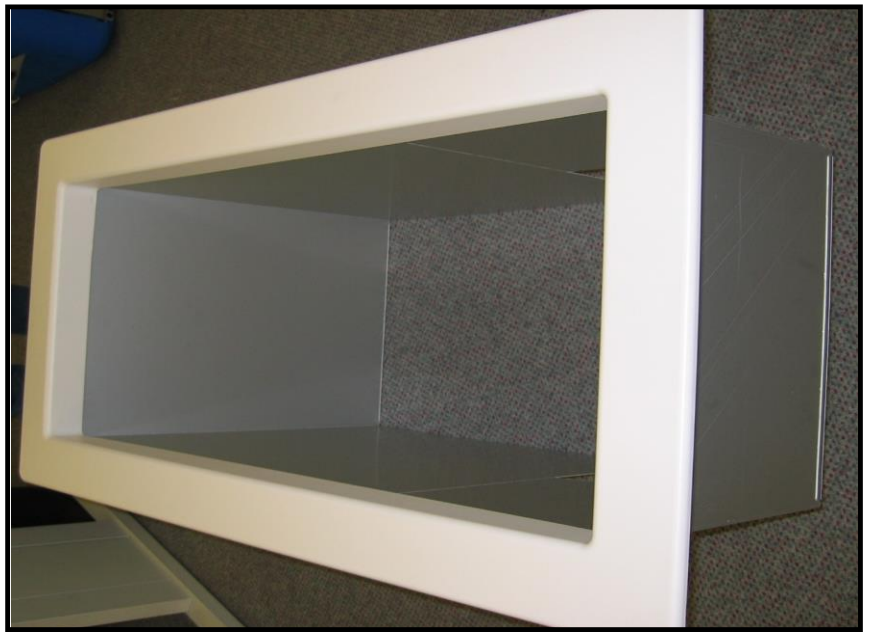


To ensure the best transport of the cold from the evaporator into the icepacks, the icepacks holders must be pressed firmly against the evaporator tubes and fixed with the provided latches.

After all 6 icepack holders are inserted, replace the cabinet frame and put the baskets in place.

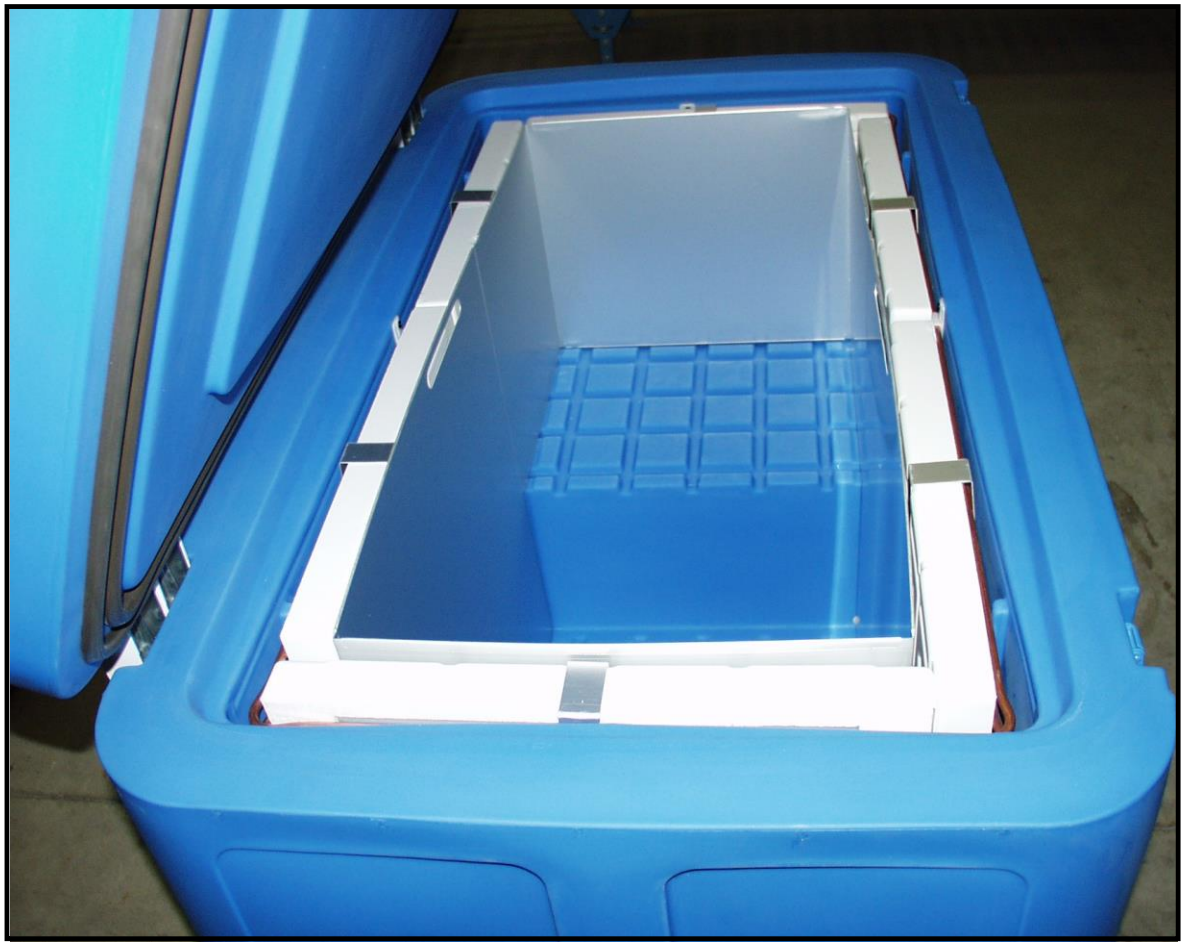
PREPARATION





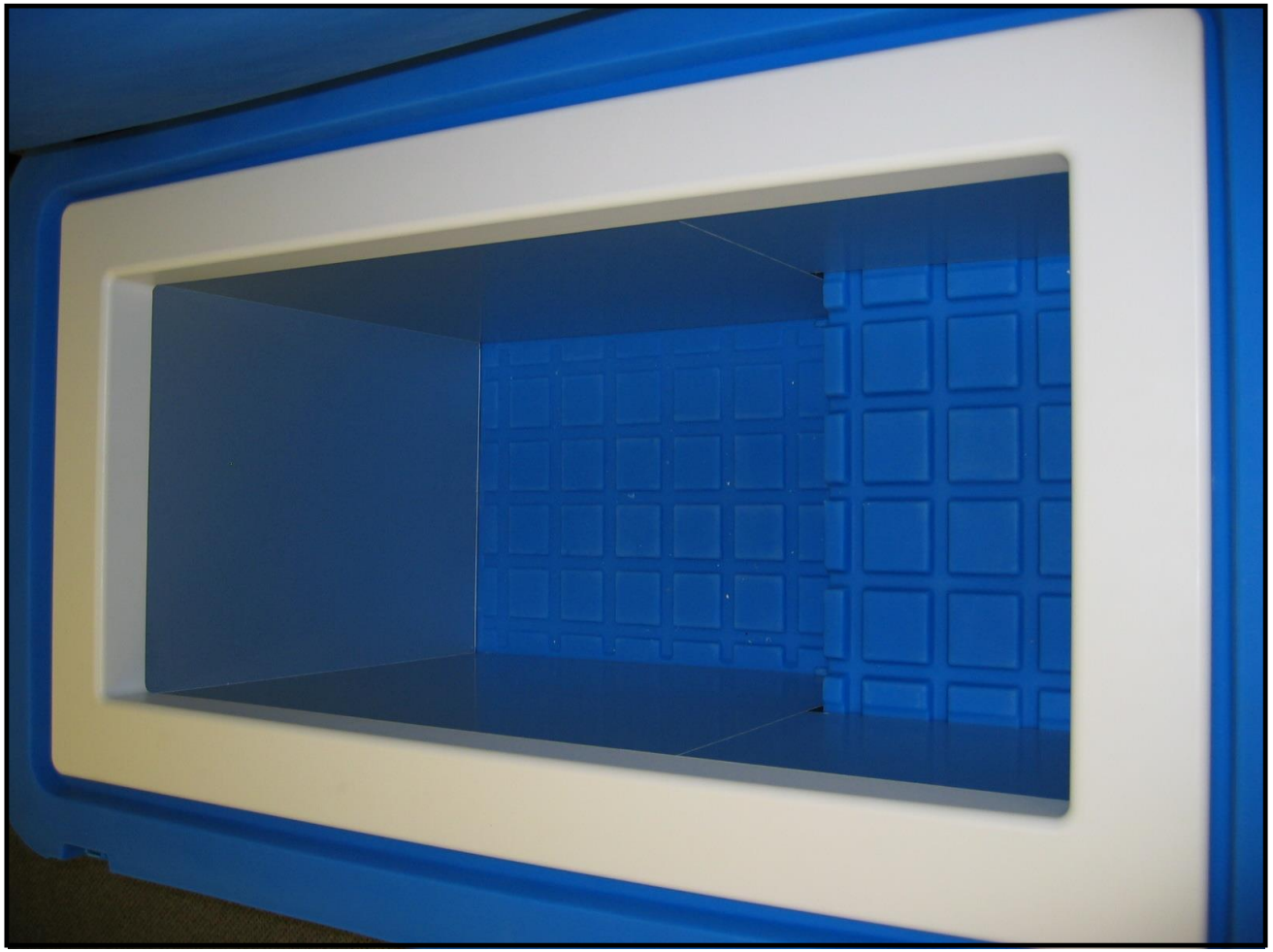
Aluminium inner liner

PREPARATION



Inner liner with Ice pack holder

PREPARATION



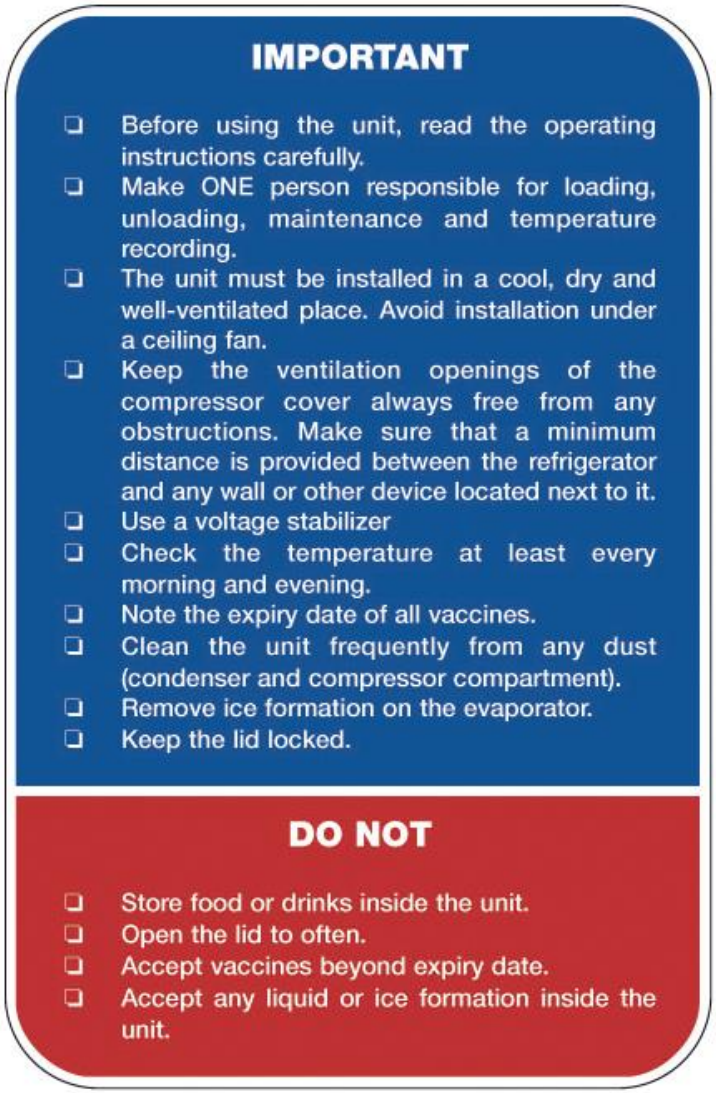
Covered Inner liner

PREPARATION

5 wire baskets (2 on bottom, 3 on top)

PREPARATION

This user recommendation sticker can be fixed on top of the lid.


IMPORTANT
Before using the unit, read the operating instructions carefully.
Make ONE person responsible for loading, unloading, maintenance and temperature recording.
The unit must be installed in a cool, dry and well-ventilated place. Avoid installation under a ceiling fan.
Keep the ventilation openings of the compressor cover always free from any obstructions. Make sure that a minimum distance is provided between the refrigerator and any wall or other device located next to it.
Use a voltage stabilizer
Check the temperature at least every morning and evening.
Note the expiry date of all vaccines.
Clean the unit frequently from any dust (condenser and compressor compartment).
Remove ice formation on the evaporator.
Keep the lid locked.
DO NOT
Store food or drinks inside the unit.
Open the lid to often.
Accept vaccines beyond expiry date.
Accept any liquid or ice formation inside the unit.

MEDICAL SYSTEMS

STORAGE OF VACCINES IN THE ILR

CAUTION:
Special care should be taken to **preserve the vaccines that get damaged by freezing**. Never store them in an ILR functioning as „Freezer“ or touching the side surfaces in the cabinet of an ILR functioning as „Refrigerator“. It is advisable to preserve such vaccines (DTP, BCG, TT) in the baskets in an ILR functioning as „Refrigerator“.

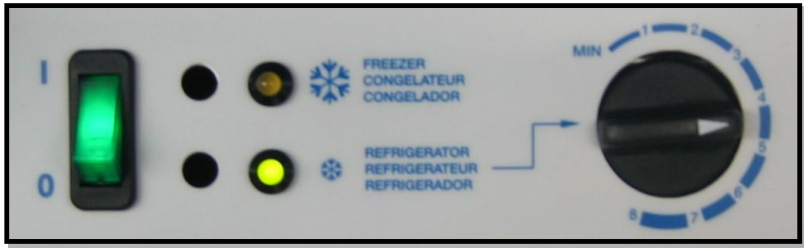
For storing vaccines:

- Keep the packets containing the vaccines **in neat rows**.
- Different vaccines should be kept separately to facilitate **easy indetification**.
- Keep about 2 cm space between rows for **circulation of air**.
- Keep a **separate thermometer** among the vaccines to ascertain the actual vaccine temperature.

USE AS A REFRIGERATOR

Install and prepare the TCW 3000 as detailed under „INSTALLATION“ and „PREPARATION“:

Shift the ON/OFF-switch to position „I“. The green light in the switch lights up indicating availability of power supply and the unit start functioning. Insert a screw driver, a pencil or similar instrument in the lower opening on the control panel and push until the green LED lights up to indicate that the TCW 3000 is in Refrigerator-mode.

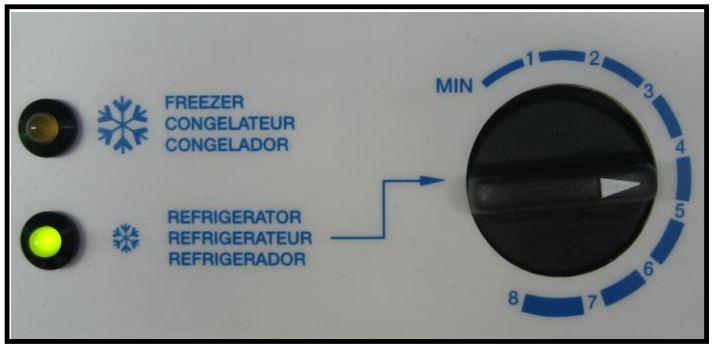


USE AS A REFRIGERATOR

Close the lid and allow the unit to run. The temperature inside the cabinet is indicated on the front thermometer. Observe the temperature from time to time.

Initially the temperature inside the TCW 3000 will be observed to be similar to or lightly below the room temperature. It will decrease slowly and remain steady within a small range after a day or two.

The refrigerator control thermostat for adjustment of the TCW 3000 to the recommended temperature is located on the front panel. This has settings from MIN to 8 (MAX). For refrigeration, we recommend to start between position „4“ and „5“. Never turn the thermostat knob to MAX-position when starting.



USE AS A REFRIGERATOR

If it is observed that the cabinet temperature remains steady at a higher temperature than the required range, turn the thermostat knob step by step to a higher setting. At each step, observe for several hours until the temperature remains steady.

If it is observed that the cabinet temperature has gone lower than the required range, turn the thermostat knob anti-clockwise to a lower setting. Open the lid, to get a warmer temperature inside the cabinet. Observe for several hours until the temperature remains steady.

When the temperature inside is observed to be steady for several hours within the required range, only then the vaccines should be transferred to the TCW 3000.

MEDICAL SYSTEMS

USE AS A REFRIGERATOR

The vaccines like DPT and BCG, which get damaged if frozen, are advised to be **kept in the upper baskets**.

After storing the vaccines keep the lid properly closed and locked

When fresh vaccines are stored in the TCW 3000 the cabinet temperature may go up initially but should fall and come to required range after few hours.

After each power cut and defrosting, don't forget to evacuate the defrost water inside the cabinet, by removing the drainage plug.

The **cabinet temperature may vary** depending upon various factors, such as,

- The ambient temperature / air circulation around the unit.
- Amount of vaccines preserved to the unit.
- Frequent openings of the lid.

MEDICAL SYSTEMS

Change-over from Refrigerator to Freezer-mode

Take out the stored vaccines, which are not to be preserved at freezer temperature, from the ILR and preserve them in alternative storage.

USE AS FREEZER

Install and prepare the TCW 3000 as detailed under „INSTALLATION“ and „PREPARATION“:

Shift the ON/OFF-switch to position „I“. The green light in the switch lights up indicating availability of power supply and the unit start functioning. Insert a screw driver, a pencil or similar instrument in the upper opening on the control panel and push until the yellow LED lights up to indicate that the TCW 3000 is in Freezer-mode.

USE AS FREEZER

IMPORTANT:
When the TCW 3000 is functioning as “FREEZER”, the thermostat on the front panel has no function and no control over the cabinet temperature. The freezer is now regulated by another thermostat (freezer thermostat) which is located in the compressor compartment and **which is not adjustable**. Factory pre-set: -18 to –24°C.

USE AS FREEZER

Water in the **icepacks will be frozen**, within 1 – 3 days, depending upon different conditions.

When all the water in the icepacks is frozen and the TCW 3000 is maintaining a constant **temperature of at least –15°C** for several hours, transfer the vaccines to be preserved in frozen condition to the TCW 3000.

After storing the vaccines, keep the lid properly closed and locked.

Change-over from Freezer to Refrigerator-mode

Take out the vaccines and preserve them in alternative storage.

Defrost and clean the TCW 3000.

DEFROSTING and CLEANING

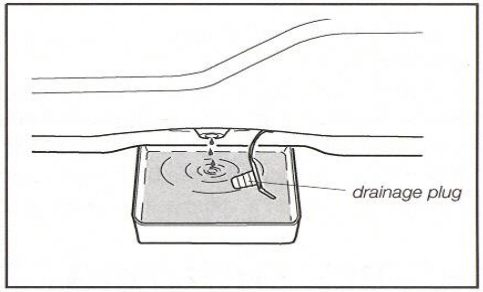
The **moisture in the air**, which enters the cabinet due to **lid opening** (and also may be due to defective-gasket or lid alignment) is **attracted by the cold surfaces** inside. So, formation of frost and ice occurs on the walls around the icepacks inside ILR compartment. When the frost layer is 6 – 12 mm thick, it is time for defrosting.

IMPORTANT:
Before defrosting the TCW 3000, the vaccines preserved in it will have to be removed and stored temporarily in another working refrigerator or freezer.
If a second refrigerator or freezer is not available, the vaccines will have to be preserved in Cold-Box or Vaccine carrier, properly lining the same with frozen ice packs, such that the vaccine temperature remains within the recommended storage temperature during the defrosting.

MEDICAL SYSTEMS

DEFROSTING and CLEANING

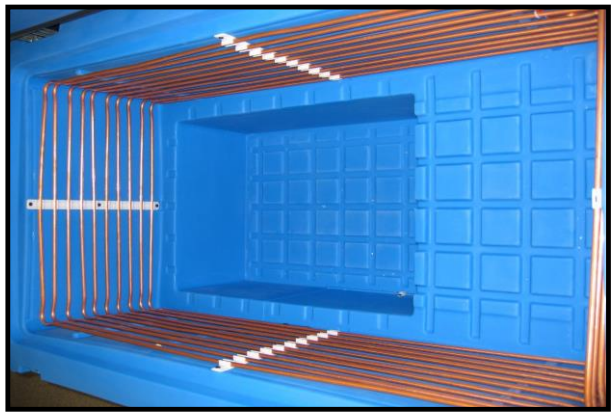
- **Switch off** the power supply and **unplug** the power supply cord from the wall socket.
- Prepare the **temporary storage** and transfer the vaccines and preserve them properly with care.
- Remove the white cabinet frame and take the frozen icepacks holders out. **Keep them wrapped together** with a thick blanket or similar insulating material. This will **keep the coldness of icepacks** during defrosting the unit.
- To speed up the defrosting process, **gently remove the complete inner liner** by holding it on its two opposite sides and lifting it uniformly.
- **Open the drainage plug** at the bottom front side of the cabinet. Keep a suitable container under the drain hose to collect the defrost water.



After each power cut and defrosting, don‘t forget to evacuate the defrost water inside the cabinet, by removing the drainage plug.

DEFROSTING and CLEANING

• **Clean all parts** inside and outside the cabinet, the lid and the gaskets with **warm water and mild detergent**. Allow the cleaned parts to dry completely.



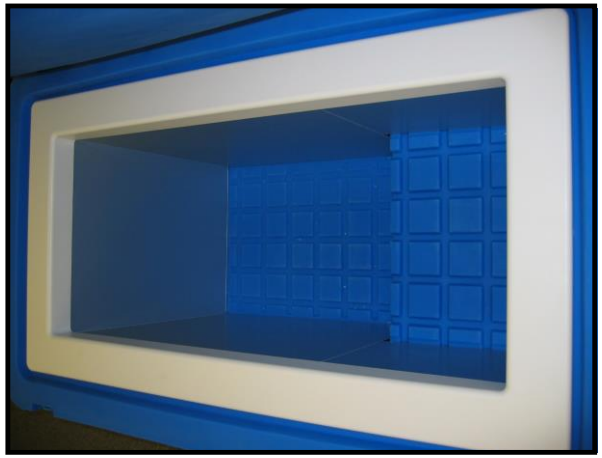
• Reset the drainage plug at its position at the bottom.

• Put back carefully the inner liner into its positon.

DEFROSTING and CLEANING

• Take the ice pack holder one by one, wipe their outside with a clean dry cloth and put them back carefully into their positions. **Examine** the icepacks **for any leackage**, before putting them back around the evaporator.

• Replace the white cabinet frame



• Close the lid. Connet the power supply plug to the wall socket and switch on the unit. Allow it to run and observe the cabinet temperature on the front thermometer.

PERIODIQUE MAINTENANCE

Daily:

• Take **temperature readings** from the thermometers and **note down** the temperature and the time of reading.
• Keep the temperature records systematically. It is suggested that minimum **2 readings should be taken** (in the morning and the afternoon) preferably at the same hours of each day.

•If the temperature is observed to be below or above the required range, adjust the thermostat by steps, allow the TCW3000 to run for about one hour under observation.
• If required, adjust the thermostat further until the required temperature range is obtained.

PERIODIQUE MAINTENANCE

Weekly:

• Examine the icepack compartment and check frost formation. If necessary defrost as explained earlier.

•If it is observed that defrosting is required to be done each week:

• Examine the gasket on the lid. Any gap between the cabinet and gasket will allow outside air to enter and will start frost formation. In such cases the hinges should be adjusted or the gaskets should be changed.

•Restrict and reduce frequency of opening the TCW3000. Open only when absolutely necessary.

MEDICAL SYSTEMS

PERIODIQUE MAINTENANCE

Monthly:

• Clean the compressor compartment and the condenser at the back side.

- Switch off the unit and and unplug the wall socket.
- Unscrew the grid from the compressor compartment. With a soft brush or vacuum cleaner make the compartment and his components free from dust.

•The condenser at the back side of the unit must also be cleaned on the same manner.

IMPORTANT:

Dust and Ice are strong insulators, keep the unit always free from this items to get a proper performance of the TCW3000.

TROUBLE SHOOTING

IMPORTANT NOTICE:

When a TCW3000 is found not working at all or not working properly, assure that the vaccine temperature is within the recommended limits. Do not open the lid unless it is very essential.

Observe the temperature from time to time and if you feel that the temperature may exceed the higher limit before the unit is repaired – transfer the vaccines to other working refrigerators, freezers or cold-boxes.

For any abnormal sound, smoke, smell etc. In the TCW3000 disconnect the plug from the wall socket and notify refrigerator technician.

TROUBLE SHOOTING

THE TCW3000 IS NOT WORKING

Observe the green indicator-lamp on the green main switch at the front panel.

If the green lamp doesen‘t light:

- Check if the **wall socket** switch is ON.
- Check if the **voltage stabilizer** (if any) is working or not.
- Check if **power supply** is available at the wall socket. This can be tested by connecting an electric lamp or other appliances to the socket. The lamp should light up or the appliances should work, if voltage is available at the socket.
- If not available: There may be some defect in the power supply circuit (blow-off fuse, loose connections, faulty switch or socket etc.) which should be rectified through competent Electrical Maintenance Technicians.
- Check that the plug is **inserted properly** into the socket.
- Check the plug for **loose connections**.
- Even after all this actions, the green lamp is not lighting – Notify **Refrigerator Technician**.

TROUBLE SHOOTING

THE TCW3000 IS NOT WORKING

Observe the green indicator-lamp on the green main switch at the front panel.

If the green lamp lights:

- Observe if the **compressor cooling fan** is working. If so, but the compressor is not running - Notify Refrigerator Technician.
- If the fan is not working, **check the thermostat setting** and adjust to a higher position and observe if the fan and the compressor are working now.
- If working – **Allow the unit to run** and adjust thermostat to obtain the recommended temperature.
- If not working – **Notify Refrigerator Technician**

TROUBLE SHOOTING

THE COMPRESSOR IS WORKING, BUT THE CABINET TEMPERATURE IS HIGHER THAN NORMAL.

The cabinet temperature may go higher than normal, but should come down after some time when:

- New vaccines are stored.
- The lid is opened frequently or kept open for longer duration.
- Unfrozen ice packs are put in for freezing.

- Check if the **recommended space** is left at the back side for good air circulation.

- Check if there is too much **ice formation** on the evaporator tubes (more than 5 mm) If so, defrost the unit.

- Check if the compressor has **switched off by thermostat** before required temperature is attained. If so, adjust thermostat setting.

TROUBLE SHOOTING

THE COMPRESSOR IS WORKING, BUT THE CABINET TEMPERATURE IS HIGHER THAN NORMAL.

- Check if the **compressor is running permanently**, but no cooling is attained – this may be due to **leakage** of refrigerant or defect in the unit. - Notify Refrigerator Technician.

- Check if the **compressor tries to start but switch-off early** by the over-load protector. This may be either due to **low voltage** or defect in the compressor or starting relay. Switch-off the unit for 30 minutes and try again. If the defect continuing - Notify Refrigerator Technician.

TROUBLE SHOOTING

CABINET TEMPERATURE IS LOWER THAN NORMAL OR BELOW 0°C WHEN FUNCTIONING AS REFRIGERATOR.

Turn the **thermostat knob anti-clockwise**, to a lower setting and observe if the compressor switchs-off by thermostat. If the same does not switch-off at the lowest setting, the thermostat is may be **defective and may have to replaced**.
-Notify Refrigerator Technician.

• In such cases, until the repair is done, the vaccines should be preserved as follows:

- Take out the frozen icepacks.
- Put in fresh (non-frozen) icepacks.
- Put some not-frozen icepacks on and around the vaccines also.
- **Run the unit under surveillance** and switch-off when the lowest recommended temperature is attained and switch-on again when the highest recommended temperature is reached and keep it running until the lowest temperature is reached again. Repeat this procedure until the thermostat is replaced.

TROUBLE SHOOTING

ABNORMAL NOISE

In case of any abnormal noise coming out from the TCW3000, try to **locate the source** of the noise. Generally it may come from the compressor compartment. In such cases:

- **Unplug** the unit from the wall socket and remove the protection grid from the compressor compatment.
- Examine if the **mounting brackets** from the compressor are in place and secure.
- Check if the **fixing screws** from the compressor fan are tight.
- Check if any **pipe or component** has changed there position or touching others. If so, rectify carefully.
- Check if the **TCW3000 is leveled** and firm installed on its base. If not, rectify.
- Even after all this actions, the noise is still present or it is coming from inside the compressor - Notify Refrigerator Technician.

MEDICAL SYSTEMS

SHUTTING DOWN

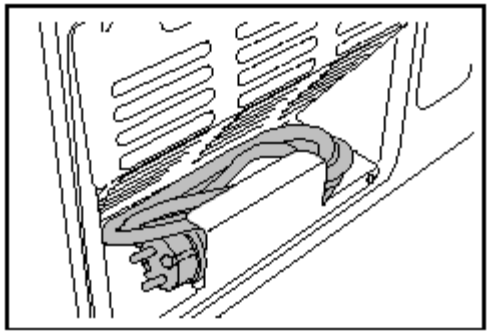
If the TCW3000 has to be shut-down for a long period or transportation:

- **Unplug** the unit from the wall socket.

- Allow to **defrost** and melt the ice from the icepacks. Remove the water from the inner cabinet completely.

- **Clean and dry-out** the inner cabinet, leave the lid a little gap of 2cm open to avoid unpleasent smell.

- For transportation; **close the lid and roll the power supply cord** into a coil and place it carefully into the cable compartment to avoid damage.



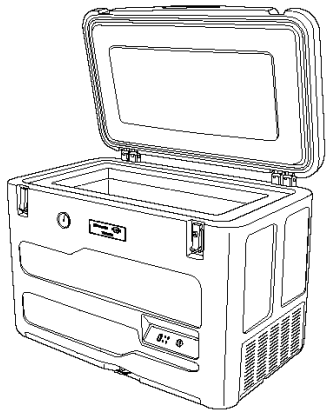
MEDICAL SYSTEMS

Spare part List

TCW 3000

Dometic

Spare parts
Pièces détachées
Ersatzteile

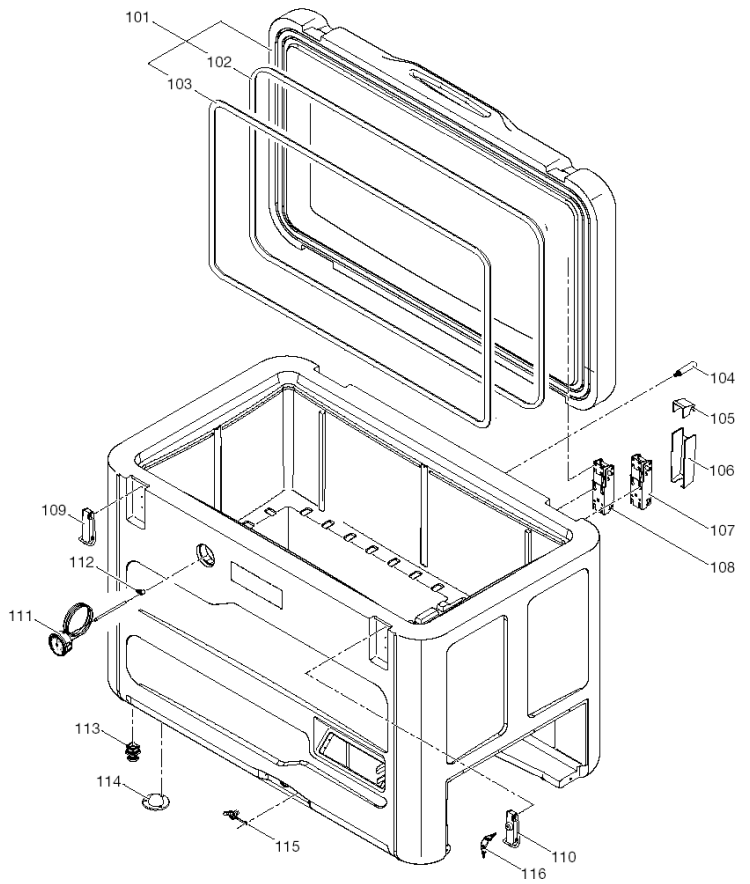


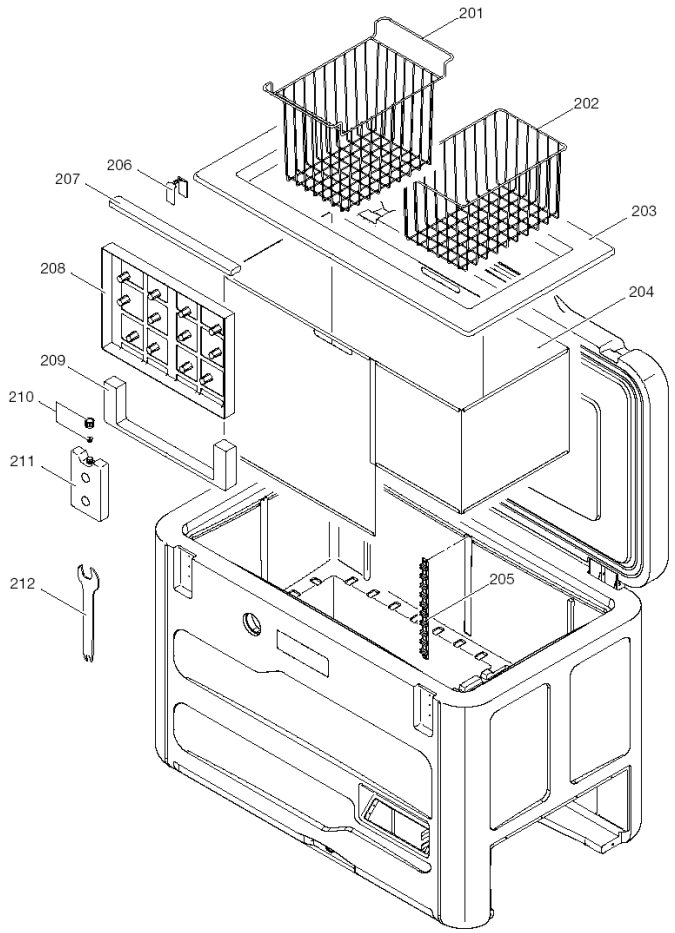
ColdChain

TCW 3000

Prod.-Nr. / Nr. de produit.	*Designation / Bezeichnung*
991.2360.01	TCW 3000

Dometic s.à r.l.
17, op der Hei
L-9809 Hosingen / Luxembourg
phone +352 - 920731-1
telefax +352 - 920731-300
email : service@dometic.lu

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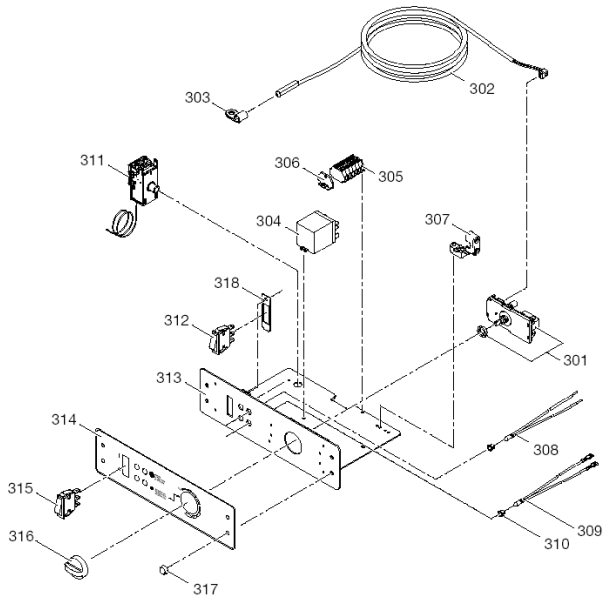
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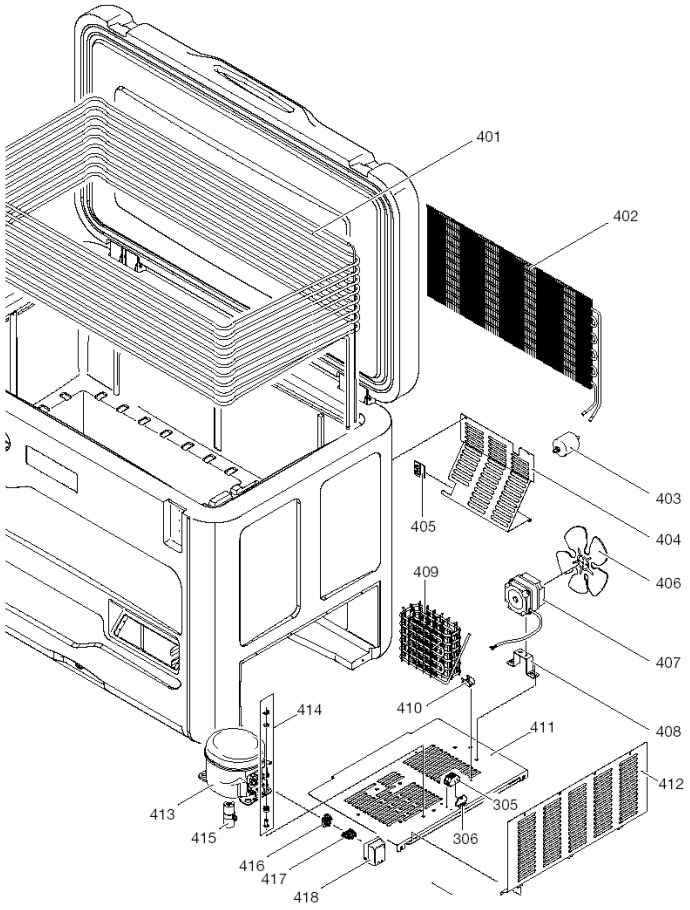


E991.2360.01

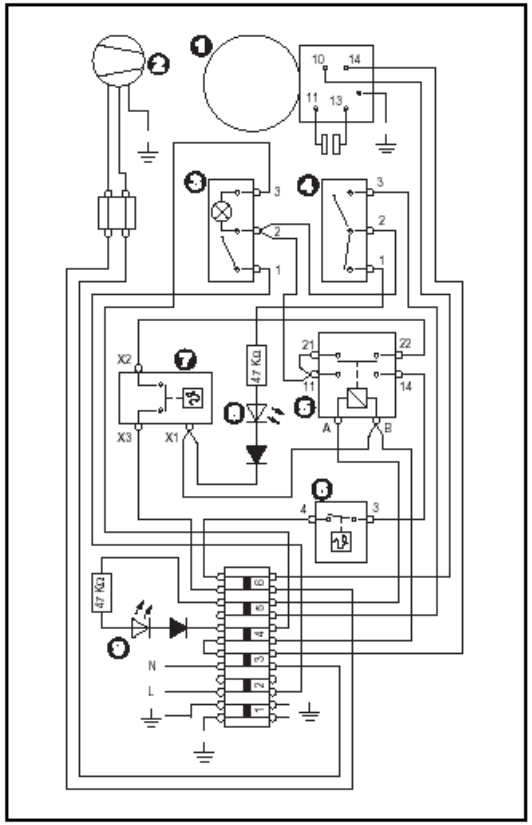
TCW 3000

Position	Part Nr:.	Description
	820.9504.32	Installation, Operation and Maintenance Manual / Eng, Esp, Fr.
	292.8542.14	Wiring diagram
	821.0049.01	Spare part drawing
101	294.2859.00	Lid cpl.
102	294.5104.04	Gasket silikon 14.5/18 L=3580
103	294.5104.03	Gasket silikon 14.5/18 L=3460
104	292.2516.00	Distance holder M8 17x60
105	296.4018.01	Hinge protection top
106	296.4018.00	Hinge protection
107	292.8503.30	Hinge outside
108	292.8503.31	Hinge inside
109	292.8506.11	Catch left
110	292.8506.12	Catch right
111	292.8538.15	Thermometer
112	292.8061.21	Clip 4,8
113	292.8543.10	Foot adjustable
114	296.1801.06	Bearing roll
115	292.2312.26	Drainage plug
116	292.9020.50	Key for lock
201	292.9427.27	Basket top
202	292.9427.28	Basket below
203	296.3274.00	Cover inner liner
204	296.3381.00	Inner liner aluminium
205	296.3407.10	Fastening clip
206	292.9225.10	Clamp Icepack holder
207	294.5406.13	Moldet foam top
208	296.3273.00	Icepack holder
209	294.5406.12	Moldet foam below
210	292.8513.00	Screw/sealing cap
211	292.8508.01	Icepack 0,6 L
212	292.2816.08	Spanner 28/12

E991.2360.01

TCW 3000

Position	Part Nr:.	Description
301	292.2008.00	Electronic thermostat E70
302	296.9804.20	Sensor E70
303	292.8061.19	Clip 6,4
304	292.8109.04	Relay
305	292.2404.95	Terminal
306	292.2404.96	End sheet
307	292.2367.10	Cord grip
308	292.9495.17	Led green
309	292.9495.18	Led yellow
310	292.9494.10	Led holder
311	292.2007.06	Thermostat K50
312	292.2044.14	Switch Ref./ Freezer
313	292.8517.13	Subplate
314	296.3602.41	Control panel
315	292.2044.13	Main switch with green light
316	296.9502.00	Thermostat knob
317	292.2795.51	Screw cap
318	296.3573.10	Switch plate
401	292.8569.11	Evaporator
402	292.8566.30	Condenser
403	296.0945.03	Dryer 1/4"
404	296.3318.20	cable compartment
405	292.2609.00	Grommet
406	292.9517.11	Fan blade
407	296.9759.51	Fan motor
408	292.9516.20	Fan bracket
409	292.8566.29	small condenser
410	296.3577.00	Bracket small condenser
411	296.3356.20	Base plate
412	296.3318.21	Protection grid



1 Compressor
2 Fan
3 ON/OFF-Switch
4 Switch Refrigerator/Freezer
5 Relais
6 Thermostat Freezer (fix)
7 Thermostat Refrigerator (adjustable)
8 LED Refrigerator (green)
9 LED Freezer (yellow)

MEDICAL SYSTEMS

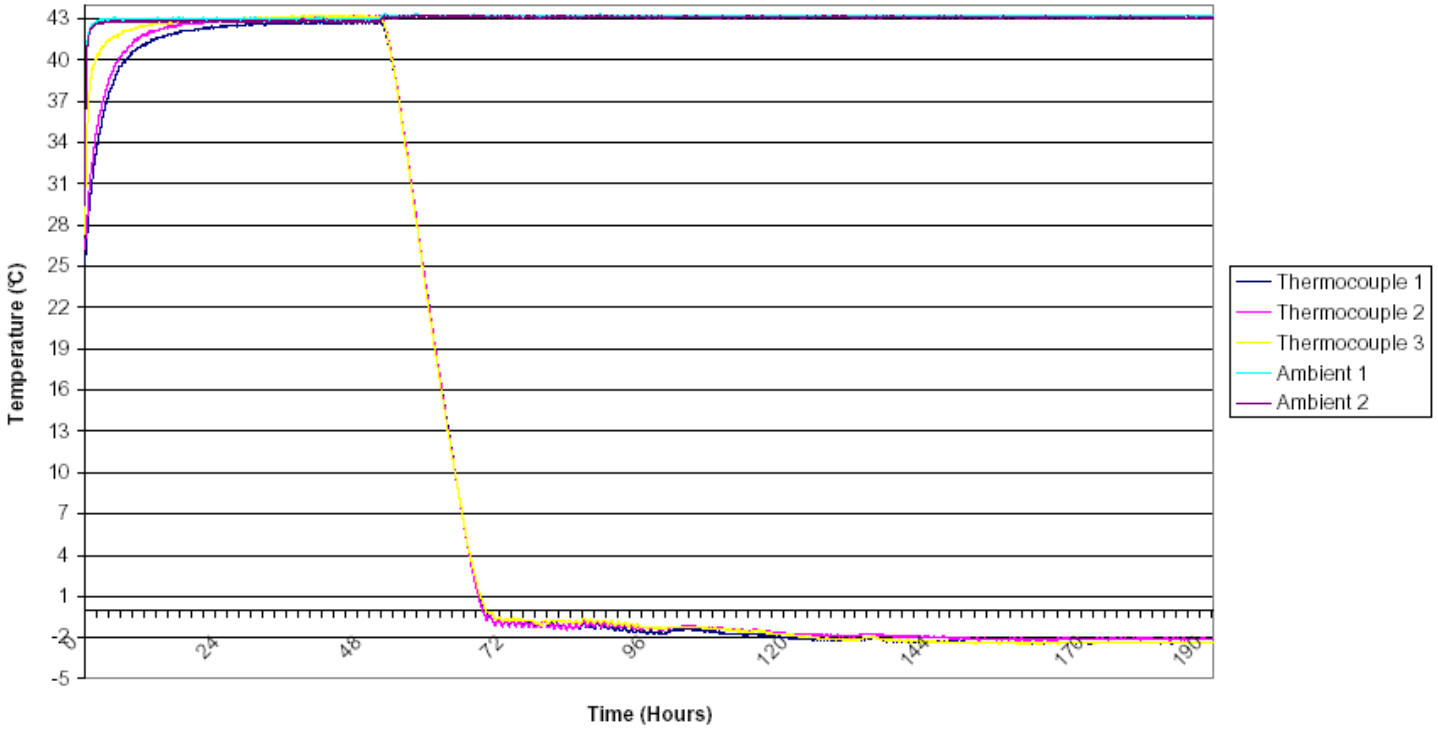
WHO / EPI Test at 43°C respectively 32°C

The refrigerator was tested in accordance with WHO/EPI Equipment performance specifications and test procedures E3: Refrigerators and freezers (E3/Proc/4) dated the 1st. January 1998 for compliance with specification reference E3/RF.3 Icelined refrigerator – compression, dated 1st. January 1998.

WHO / EPI Test / 43°C

Cooldown test at +43℃	
Temperature control settings	3
Time for internal temperatures to stabilise (hours)	115.6
Mean on time (mins)	56
Mean off time (mins)	17
Percentage running time (%)	73
Electricity consumption per 24h (kWh)	2.95

Figure 1 Cooldown test at +43℃



MEDICAL SYSTEMS

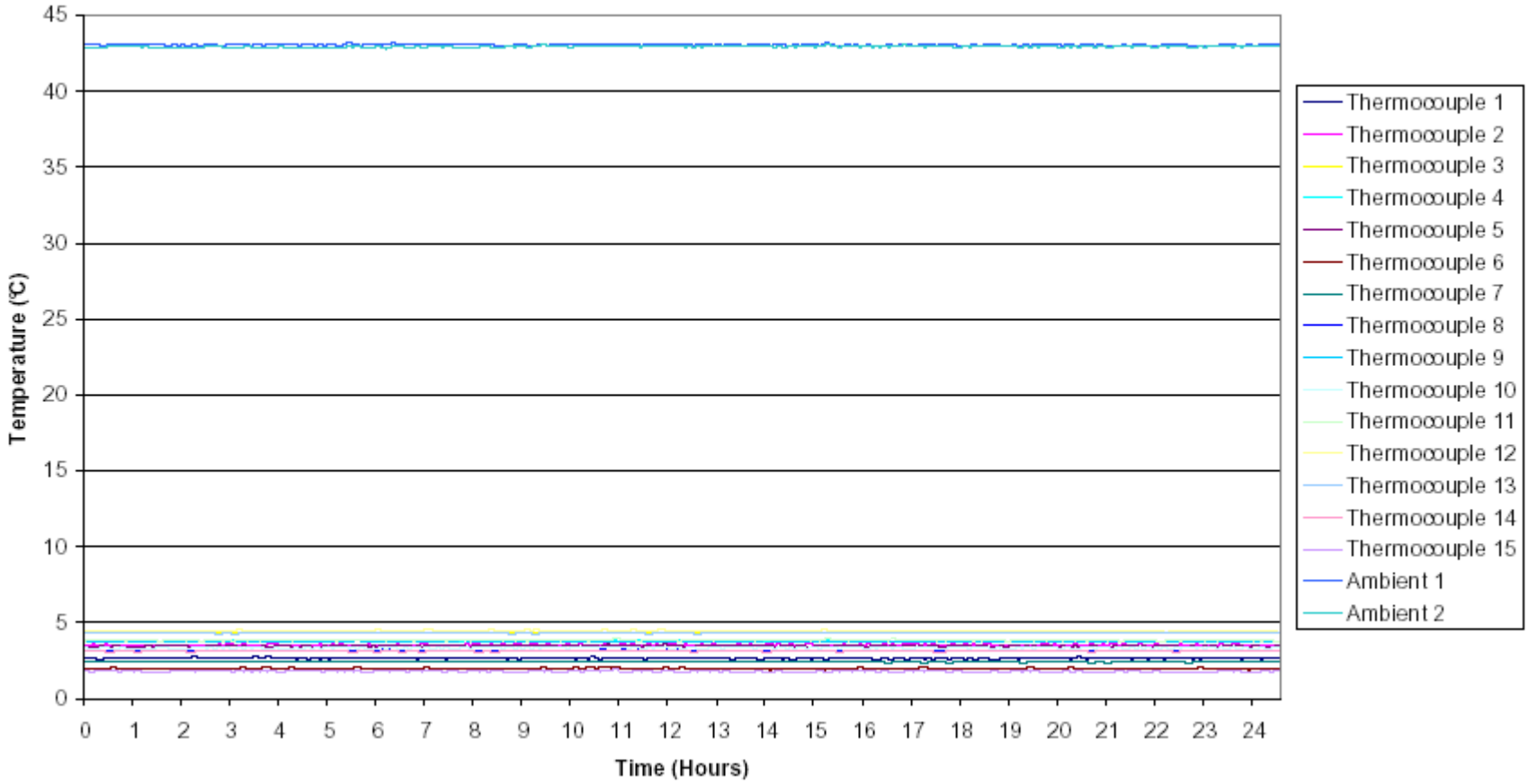
WHO / EPI Test / 43°C

Stable running test at +43℃ (continuous energy sup ply)	
Temperature control settings	3.5
Mean thermocouple temperatures in vaccine storage compartment (℃)	
1	2.7
2	3.5
3	4.4
4	3.8
5	3.5
6	2.0
7	2.4
8	3.2
9	3.8
10	3.4
11	3.9
12	4.5
13	4.3
14	3.1
15	1.8
Overall temperatures (℃)	
Mean	3.3
Maximum	4.6
Minimum	1.8
Position of warmest thermocouple	12
Position of coldest thermocouple	15
Compressor duty cycles and energy consumption	
Mean on time (mins)	9
Mean of time (mins)	20
Percent running time (%)	32
Electricity consumption per 24h (kWh)	1.75

MEDICAL SYSTEMS

WHO / EPI Test / 43°C

Figure 2 Stable running at +43℃ (continuous energy supply)



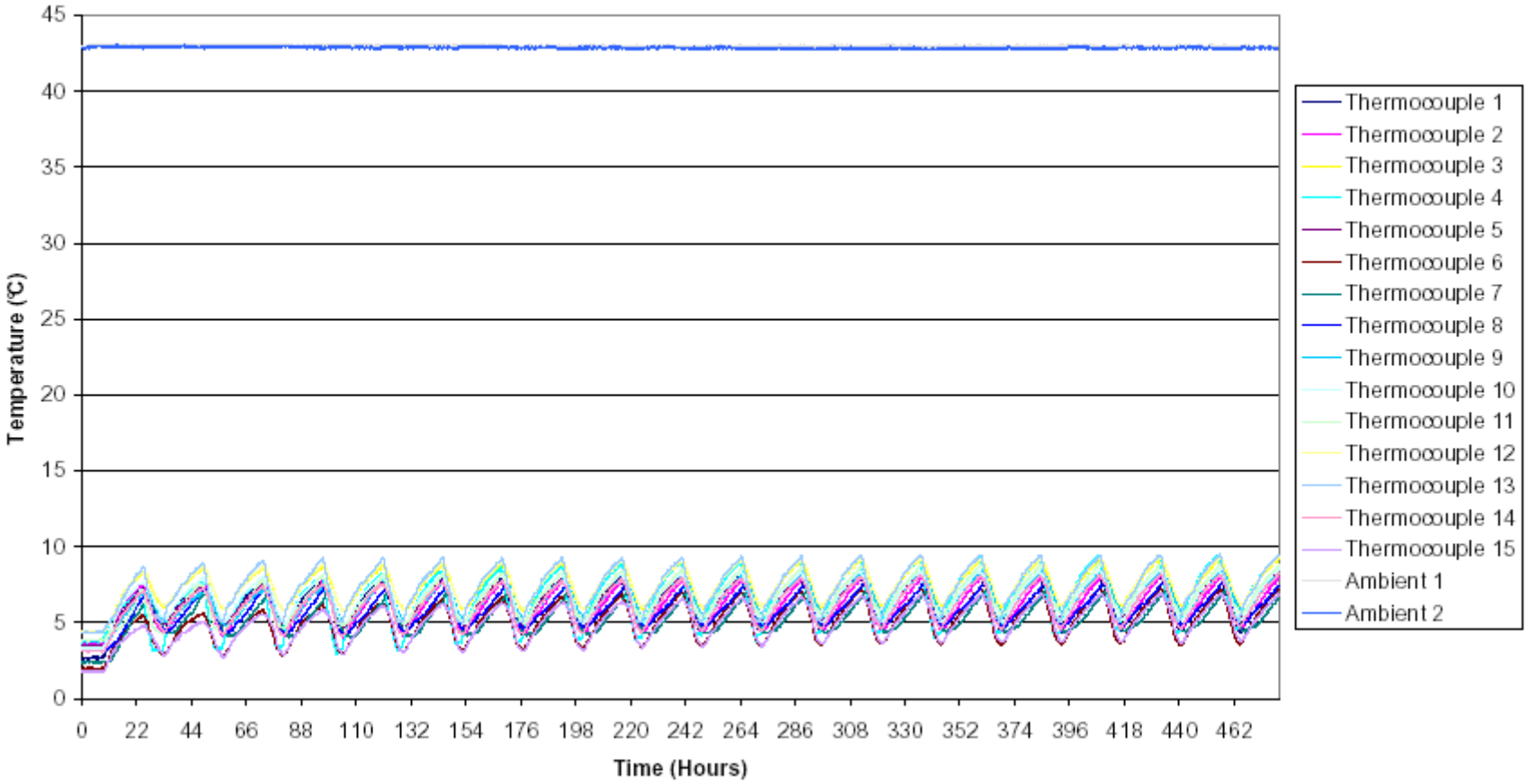
WHO / EPI Test / 43°C

Stable running test at +43℃ (intermittent energy s upply)	
Temperature control settings	3.5
Mean thermocouple temperatures in vaccine storage compartment (℃)	
1	6.2
2	6.1
3	7.4
4	6.5
5	6.4
6	5.1
7	5.4
8	5.8
9	6.5
10	6.7
11	6.7
12	7.5
13	7.2
14	6.2
15	4.9
Overall temperatures (℃)	
Mean	6.3
Maximum	9.6
Minimum	1.8
Position of warmest thermocouple	12
Position of coldest thermocouple	15
Compressor duty cycles and energy consumption	
Mean on time (mins:sec)	50:17
Electricity consumption per 24h (kWh)	1.43

MEDICAL SYSTEMS

WHO / EPI Test / 43°C

Figure 3 Stable running at +43℃ (Intermittent ener gy supply)

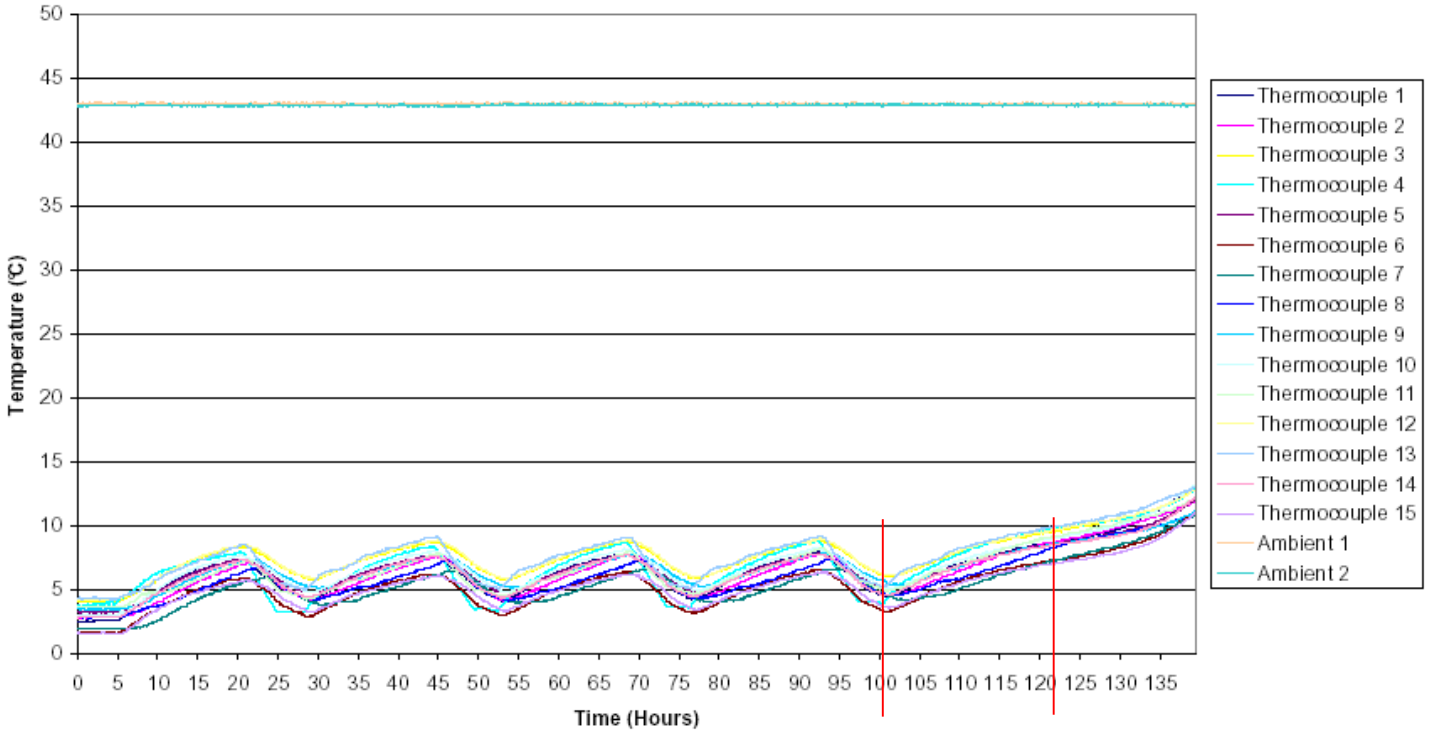


MEDICAL SYSTEMS

WHO / EPI Test / 43°C

Holdover time at +43℃ (intermittent energy supply)	
Length of time of preceeding compressor "off" phase (mins:sec).	9:27
Time for warmest thermocouple in vaccine load to reach +10℃ (hours)	22.0

Figure 4 Holdover at +43℃ (Intermittent energy sup ply)



MEDICAL SYSTEMS

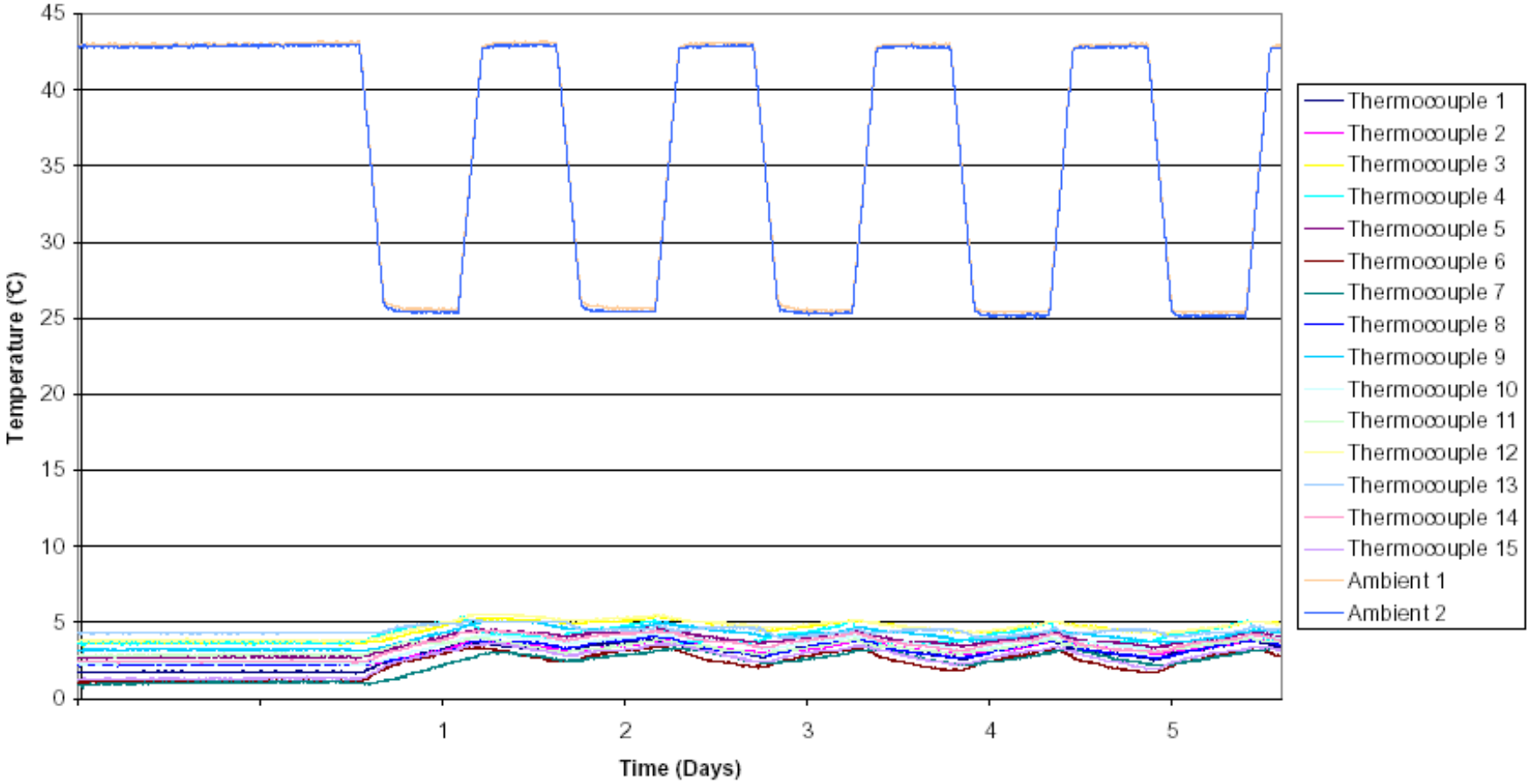
WHO / EPI Test / 43°C

Day/night test +43℃ and 25℃ (continuous energy su pply)					
Temperature control settings	3.5				
Day	1	2	3	4	5
Thermocouple temperatures within the vaccine load (℃)					
1	2.3	3.5	3.3	3.2	3.2
2	2.6	3.5	3.4	3.3	3.3
3	4.0	5.1	4.9	4.7	4.6
4	4.2	4.5	4.1	4.0	4.1
5	3.2	4.4	4.1	3.9	3.8
6	1.8	3.0	2.7	2.5	2.4
7	1.4	2.8	2.8	2.7	2.7
8	2.5	3.7	3.4	3.2	3.2
9	3.6	4.8	4.4	4.2	4.0
10	2.7	4.0	3.8	3.6	3.6
11	3.2	3.5	3.4	3.3	3.4
12	4.2	5.3	5.0	4.7	4.6
13	4.5	4.8	4.4	4.4	4.4
14	2.9	4.2	3.9	3.7	3.6
15	2.0	3.3	3.0	2.8	2.7
Overall thermocouple temperatures (℃)					
Mean	5.4	5.6	5.5	5.2	5.2
Maximum	0.9	2.4	2.0	1.9	1.7
Minimum	3.1	4.0	3.8	3.6	3.6
Position of warmest thermocouple	13	12	12	3 & 12	3 & 12
Position of coldest thermocouple	7	7	6	6	6

MEDICAL SYSTEMS

WHO / EPI Test / 43°C

Figure 5 Day/night test +43℃ and +25℃ (continuous energy supply)



WHO / EPI Test / 43°C

COMMENTS AND CONCLUSIONS

For the purposes of this report the performance of the refrigerator was evaluated against Section 1 to 5 of WHO/EPI Equipment performance specifications and test procedures E3: Refrigerators and freezers (E3/Proc/4) dated the1st January 1998 for compliance with relevant sections of specification reference E3/RF.3 Icelined refrigerator - compression, dated 1st January 1998.

Cool down at +43°C

The appliance took 115.6 hours to stabilize. No recommendations are specified for this test.

Stable running at +43°C (continuous energy supply)

The specification requires that the internal temperatures of the vaccine load must remain in the range of +0 and +8℃. All internal temperatures we re all between the specified range of +0℃ and +8℃. No temperatures fell below 0℃ in any part o f the refrigerator at any time.

Stable running at +43°C (intermittent energy supply)

The specification requires that the internal temperatures of the vaccine load must remain in the range of +0℃ to +8℃. The maximum temperature reco rded was 9.6 ℃, which exceeds the specification requirement. No temperature was below 0℃ in any part of the refrigerator at any time.

Holdover time at +43°C (intermittent energy supply)

No standard is set but the specification recommends a target time of more than 20 hours in a continuous external temperature of +43℃. The hold over time was 22.0 hours which exceeds the specification requirements. No temperatures were below 0℃ in any part of the refrigerator at any time.

Day/night test +43°C/+25°C (continuous energy supply)

The specification requires that the internal temperatures of the vaccine load must remain in the range of +0℃ and +8℃ while the ambient temperatur e simulates a day (43℃) and night (25℃) cycle.

The internal temperatures were all within the specification range of +0°and +8℃.

No temperatures were below 0℃ in any part of the r efrigerator at any time.

MEDICAL SYSTEMS

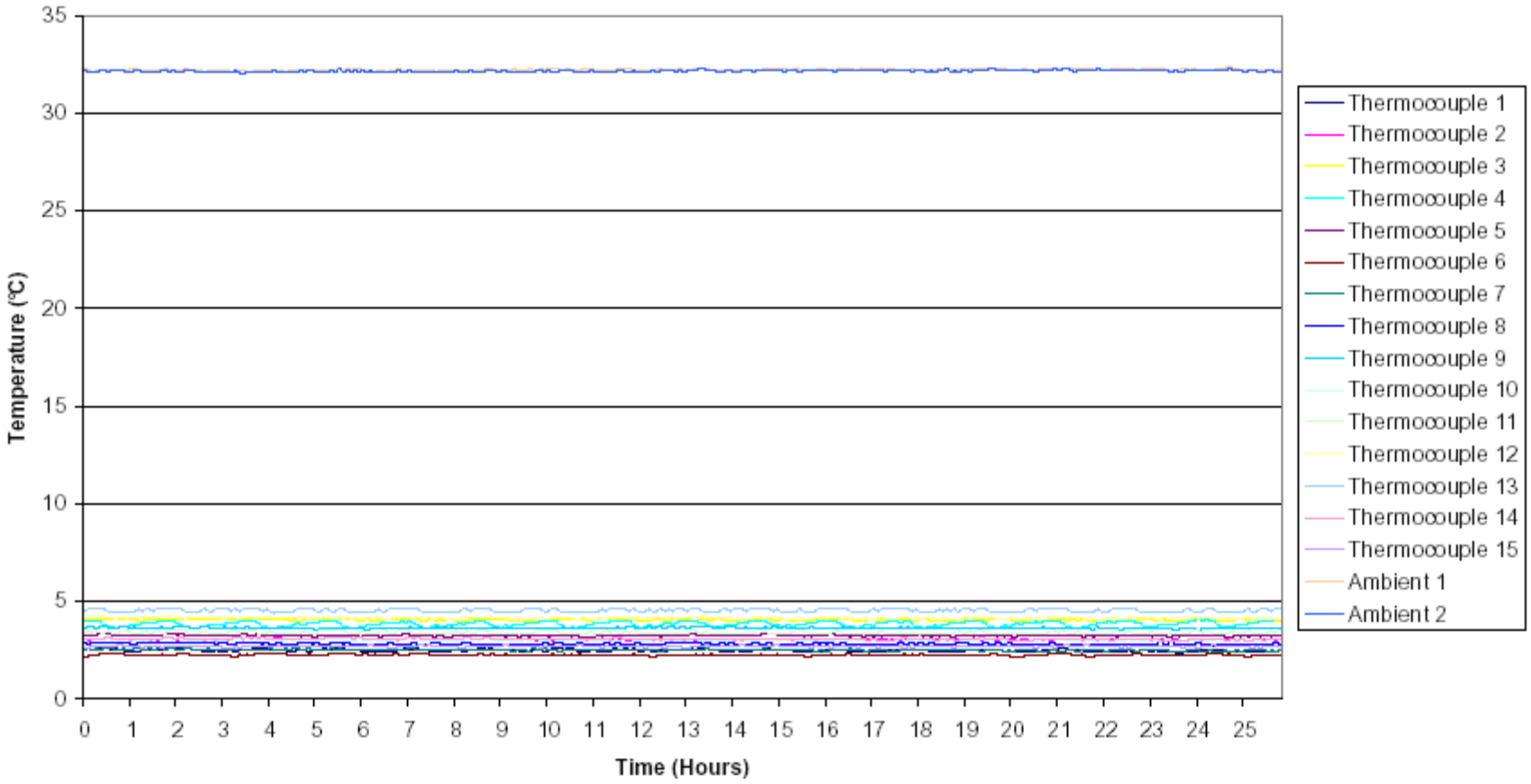
WHO / EPI Test / 32°C

Laboratory Code	D1
Stable running test at +32℃ (continuous energy sup ply)	
Temperature control settings	3.5
Mean thermocouple temperatures in vaccine storage compartment (℃)	
1	2.5
2	3.1
3	4.1
4	3.8
5	3.3
6	2.2
7	2.5
8	2.8
9	3.6
10	3.0
11	3.4
12	4.2
13	4.5
14	3.1
15	2.7
Overall temperatures (℃)	
Mean	3.3
Maximum	4.6
Minimum	2.1
Position of warmest thermocouple	13
Position of coldest thermocouple	6
Compressor duty cycles and energy consumption	
Mean on time (mins)	23
Mean of time (mins)	74
Percent running time (%)	25
Electricity consumption per 24h (kWh)	1.17

MEDICAL SYSTEMS

WHO / EPI Test / 32°C

Figure 6 Stable running at +32°C (continuous energy supply)



MEDICAL SYSTEMS

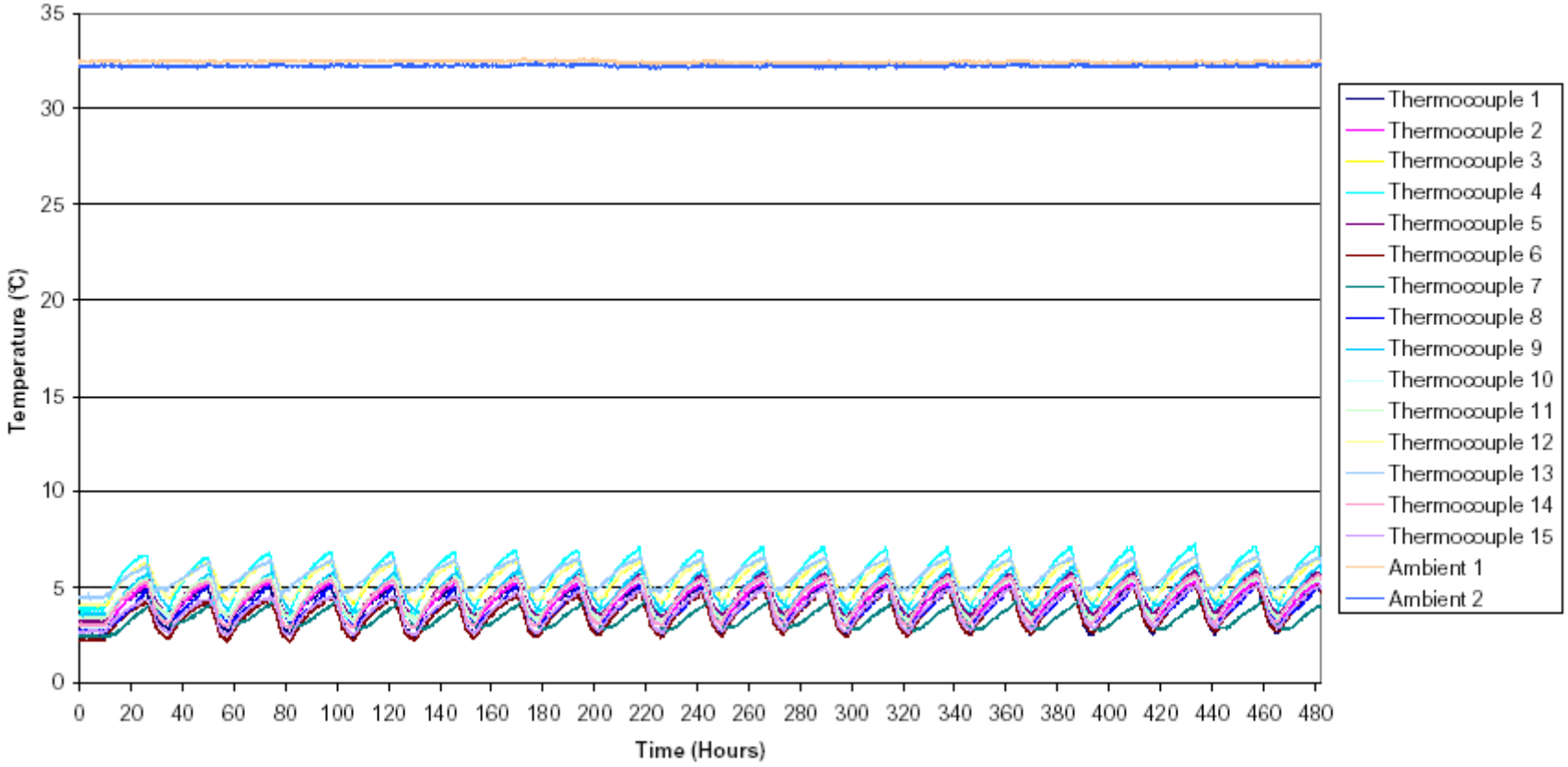
WHO / EPI Test / 32°C

Laboratory Code	D1
Stable running test at +32℃ (intermittent energy s upply)	
Temperature control settings	3.5
Mean thermocouple temperatures in vaccine storage compartment (℃)	
1	4.0
2	4.3
3	5.4
4	5.3
5	4.6
6	3.6
7	3.5
8	4.0
9	4.9
10	4.4
11	4.5
12	5.4
13	5.7
14	4.4
15	3.8
Overall temperatures (℃)	
Mean	4.5
Maximum	7.3
Minimum	2.1
Position of warmest thermocouple	13
Position of coldest thermocouple	7
Compressor duty cycles and energy consumption	
Mean on time (mins)	73
Electricity consumption per 24h (kWh)	1.07

MEDICAL SYSTEMS

WHO / EPI Test / 32°C

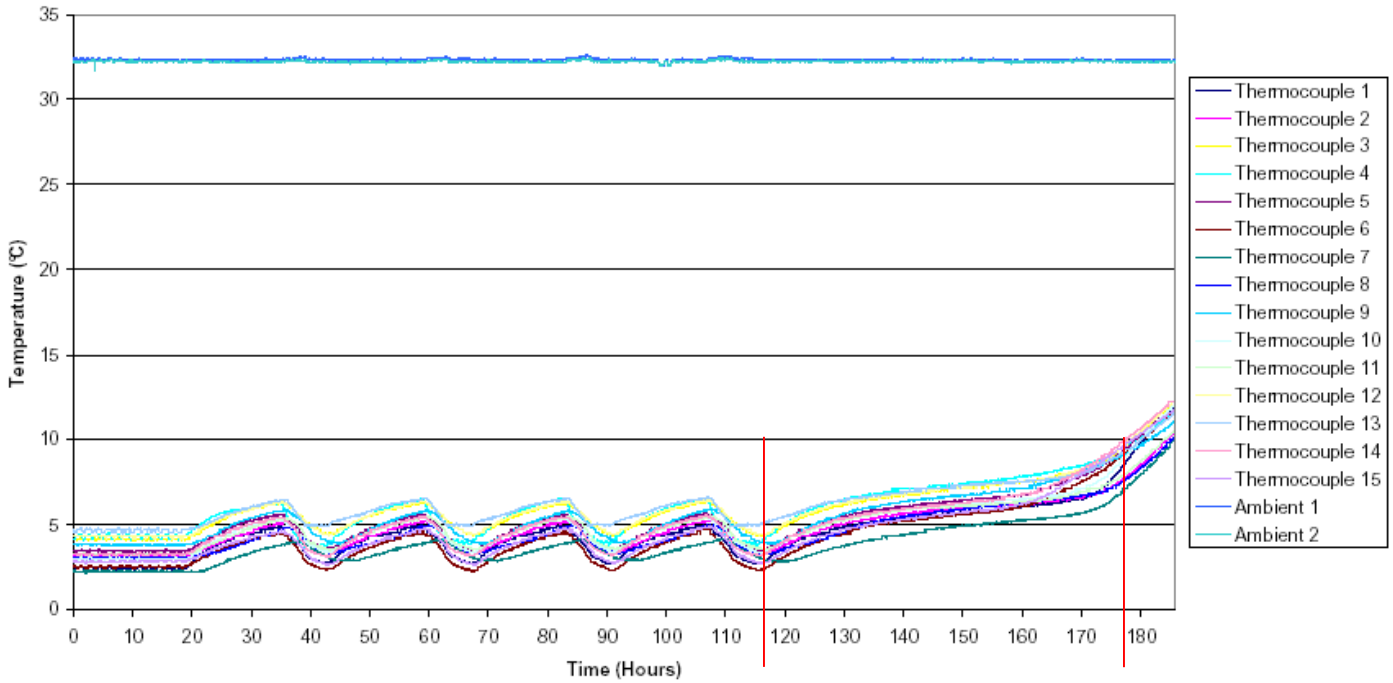
Figure 7 Stable running at +32°C (intermittent energy supply)



WHO / EPI Test / 32°C

Laboratory Code	D1
Holdover time at +32℃ (intermittent energy supply)	
Length of time of preceeding compressor "off" phase (mins).	39
Time for warmest thermocouple in vaccine load to reach +10℃ (hours)	61.7

Figure 8 Holdover at +32℃ (intermittent energy sup ply)

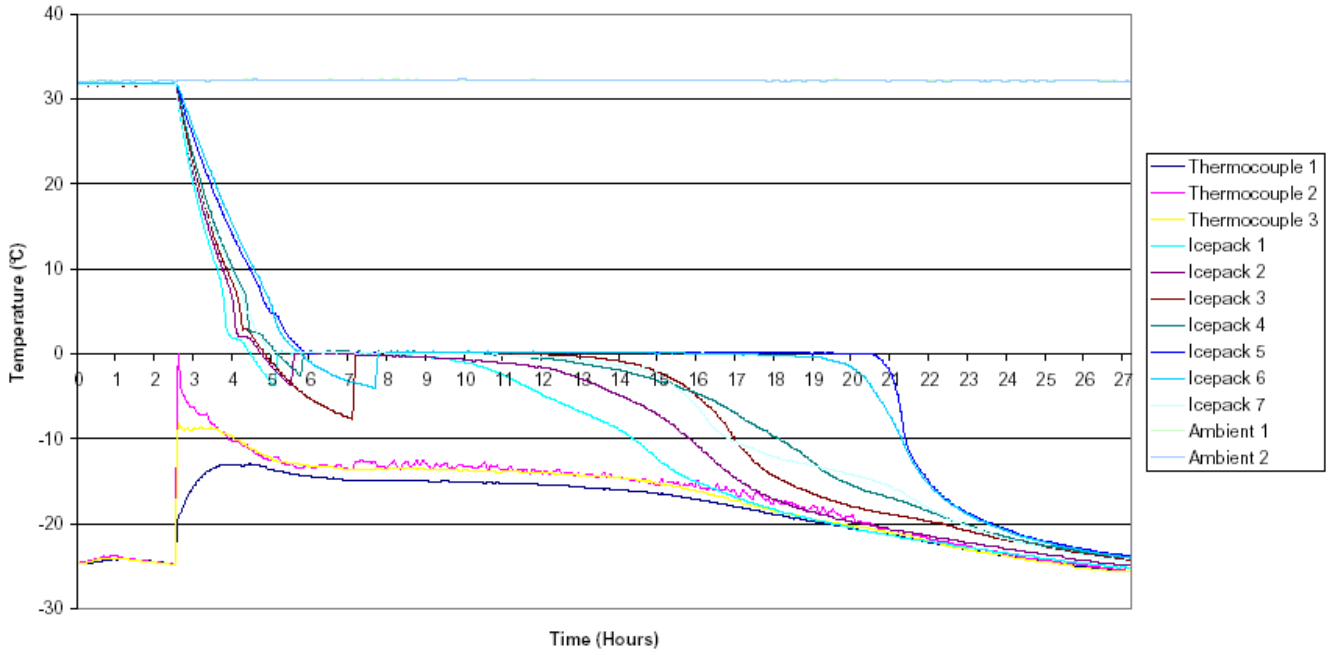


MEDICAL SYSTEMS

WHO / EPI Test / 32°C

Laboratory Code	D1
Icepack freezing test at +32℃	
Weight of icepacks frozen in a 24 hour period (kg)	4.2
Time taken for warmest icepack to reach -3℃ (hours)	18.5
Comments	Internal temperature of freezer returns to -25℃ within the 24 hour freezing cycle.

Figure 9 Icepack freezing at +32℃ (continuous ener gy supply)



WHO / EPI Test / 32°C

Laboratory Code	D1
Compressor starting test at +32℃ (appliance empty)	
Nominal voltage	230V
Compressor at ambient temperature	
Minimum voltage at which compressor will start 10 out of 10 times	115
Percent below nominal voltage	50
Comments	Test ceased at 115 V (50% below nominal voltage) compressor still starting 10 out of 10 times.
Compressor at operating temperature	
Minimum voltage at which compressor will start 10 out of 10 times	115
Percent below nominal voltage	50
Comments	Test ceased at 115 V (50% below nominal voltage) compressor still starting 10 out of 10 times.

MEDICAL SYSTEMS

WHO / EPI Test / 32°C

Stable running at +32°C (continuous energy supply)

The specification requires that the internal temperatures of the vaccine load must remain in the range of +0 and +8℃. All internal temperatures we re all between the specified range of +0℃ and +8℃. No temperatures fell below 0℃ in any part o f the refrigerator at any time.

Stable running at +32°C (intermittent energy supply)

The specification requires that the internal temperatures of the vaccine load must remain in the range of +0℃ to +8℃. All internal temperatures we re all between the specified range of +0℃ and +8℃. No temperatures fell below 0℃ in any part o f the refrigerator at any time.

Holdover time at +32°C (intermittent energy supply)

No standard is set. The holdover time was 61.7 hours. No temperatures were below 0℃ in any part of the refrigerator at any time.

Icepack freezing test at +32°C (continuous energy supply)

No standard is set. The appliance froze 7 x 0.6 litre icepacks (4.2kg) within 18.5hours. The internal temperatures returned to –25℃ within the 24hour fr eezing period.

Compressor starting at +32°C

The specification requires ten successful starts out of ten in both hot and cold starts at a minimum of 22% below the manufacturers stated nominal voltage.

The compressor starting test was ceased at 115 V (50% below nominal voltage) the compressor still started 10 out of 10 times at ambient temperature. This exceeds the requirements of the standard.

The compressor starting test was ceased at 115 V (50% below nominal voltage) the compressor still started 10 out of 10 times at operating temperature. This exceeds the requirements of the standard.

MEDICAL SYSTEMS

IN COMPARISON WITH:

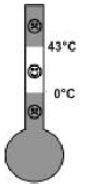
	TCW 3000 Dometic	MK 304 Vestfrost
Body material:	Rotomolded polyethylene	Coated painted steel
Ice-packs:	36 x 0,6 litres	24 x 0,6 litres + 4 x 1,5 litres
Vaccine storage capacity:	126,5 litres	108 litres
Capillary tube thermometer	Yes	No
Insulation:	100 mm	80 mm
Rust resistant:	Yes	No
Lid gasket:	Double / silicon changable	Singel not changable
Hinges:	Double each side	Single each side
On / Off switch:	Yes	No
Refrigerator mode:	Yes	Yes
Freezer mode:	Yes	No
Evaporator:	Copper tubes repairable	Steel tubes foamed-in
Condenser:	Steel tubes repairable	Steel tubes foamed-in
Drainage plug:	Front of the unit	Under the unit
Rolls	Yes	No
Mice protected:	Yes	No

MEDICAL SYSTEMS

Technical specification for TCW 3000 Ice liner Refrigerator or Freezer

Outer body material:	polyethylene	rotomolded
Inner body material:	polyethylene	rotomolded
Outer dimensions: L x D x H		1280 x 780 x 900
Inner dimensions: L x D x H		1060 x 560 x 350 / 620 x 450 x 250
Manufacturers gross volume:		278 litres
Manufacturers net volume:		180 litres
Vaccine storage capacity:		126.5 litres
Ice lining with Ice packs of 0.6 l:		36
Hold overt time at 43°C and 32°C		22 and 61 hours

- Designed for hot zone appliances at 43°C with high humidity
- Meets *WHO/UNICEF* Standards E3/RF.3 — PIS code: E3/107-M
- Container and Lid rust-resistant (rotomolded polyethylene)
- Insulation of 100 mm polyurethane foam (CFC free)
- Double silicon lid gasket
- Double hinges on each side
- Danfoss Compressor FR11G
- Refrigerant R134a: 142 gr.
- On / Off switch with LED light
- Refrigeration or Freezer mode possibility with LED lights
- Electronic thermostat for refrigerator
- Mechanical thermostat for freezer
- Recommendations for users on the lid
- Evaporator: copper tubes
- Condenser: horizontal painted steel pipes (outside)
- Air circulation distance holders (outside)
- Special internal design for good air circulation around vaccines
- Fixed outer drainage plug
- Lockable lid with lock in the catch
- 5 wire baskets (2 on bottom, 3 on top)
- External readable capillary tube thermometer
- Integrated special plastic bearing rolls
- 4 adjustable stoppers



CODE **PIS E3/107-**

Hot Zone Appliance

Inclined refrigerator or freezer, compression type: Model TCW 3000

COMPANY NAME AND ADDRESS

Dometic SARL
17, Op Der Hei
L-9809 Hosingen
Luxembourg
Telephone: *00 352-492-07 311*
Fax: *00 352-492-07 31 300*
E-mail: *medical.systems@dometic.lu*

SPECIFICATIONS

	REFRIGERATOR		FREEZER		UNITS
Vaccine storage capacity	126.5		—		liters
Manufacturers gross volume	278		278		liters
External dimensions, H x W x D	90x128x78		—		cm.
PERFORMANCE AT	**32**	**43**	**32**	**43**	**degrees C**
Icepack freezing, without vaccine:	—	—	4.2	—	kg/18.5hrs.
Holdover time during power cut :	61.7	22.0	—	—	hours
Electricity consumption:					
Without icepack freezing (continuous) :	1.17	1.75	—	—	kWh/24 hrs
Without icepack freezing (intermittent):	1.07	1.43			kWh/24 hrs

ENERGY REQUIREMENTS

Energy sources: 220 - 240 VAC/50Hz
Under preparation: 110 - 130 VAC/60 Hz, 220 - 240 VAC 50/60 Hz
Minimum of 8 hours electricity needed per 24 hours at 43ºC

SPARES NEEDED PER 10 UNITS	Part No.	Qty	Price/unit
Compressor Danfoss FR11G	296.9701.52	1	€86.00
Starting device (Relay)	296.9706.39	3	€2.66
Starting device (Capacitor)	296.9706.10	3	€12.71
Electronic thermostat for refrigerator	292.2008.00	1	€17.79
Sensor for electronic thermostat	296.9804.20	1	€4.14
Thermostat for freezer	292.2007.06	1	€6.78
Fan motor	296.9759.51	1	€19.06

COMMENTS AND ACCESSORIES

Reports: Intertek Research & testing Centre Report 62330 Issue 1(October 2004); Meets WHO/UNICEF Standard:E3/RF3.
Appliance equipped with HST compressor
Accessories: supplied with external thermometer and lockable lid, 5 vaccine storage baskets

2004 PRICES (EXW)

Shipping volume /gross weight *1.05 m³ /125 kg*

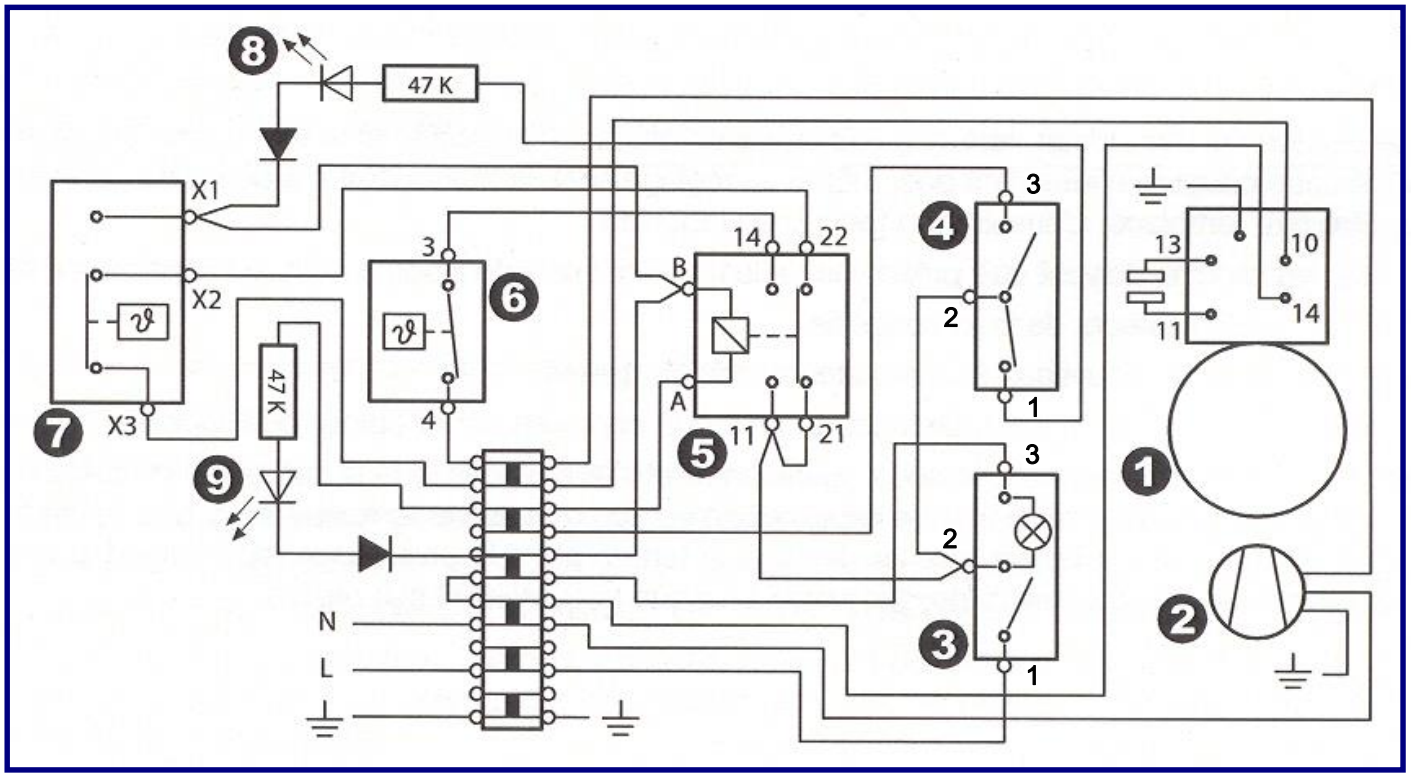
Quantity: :	Price per unit
1 – 39	1855 €
40 - 99	1762 €
100 +	1675 €

MEDICAL SYSTEMS

Thank you for your attention !

User manual

WIRING DIAGRAM



1 Compressor
2 Fan
3 ON/OFF-Switch
4 Switch Refrigerator/Freezer
5 Relais
6 Thermostat Freezer (fix)
7 Thermostat Refrigerator (adjustable)
8 LED Refrigerator (green)
9 LED Freezer (yellow)

MEDICAL SYSTEMS

TCW 3000

Also available for Cold Chain under the following Models:

TCW 3000 G	with „Gold“ electronic	as Refrigerator	230V 50/60 Hz or 110/60Hz
FCW 3000 G	with „Gold“ electronic	as Frezzer	230V 50/60 Hz or 110/60Hz
TCW 3000 DC	with elect. Thermostat	as Refrigerator	12V to 24V DC (Solar)

Also available for Blood safety under the following Models:

MB 3000 G	with „Gold“ electronic	as Refrigerator	230V 50/60 Hz or 110/60Hz
MB 3000 E	with „Eliwell“ electronic	as Frezzer	230V 50/60 Hz or 110/60Hz
MB 3000 DC	with „Eliwell“ electronic	as Refrigerator	12V to 24V DC (Solar)

MEDICAL SYSTEMS

TCW 3000 Ice liner Refrigerator or Freezer

As TCW3000 G or MB3000 G

To monitor the temperatures via Dometic Medical Control Center (DMCC) cabeling, Ethernet and Internet

TCW 2000

New unit to replace the TCW1990:

Rotomolded unit like TCW3000
Two independent cabinets Refrigerator / Freezer
Two separat lids
Refrigerator ice-lined

NEW

TCW 2000